

NO-A102 648

INTEGRATED INFORMATION SUPPORT SYSTEM (IIS) VOLUME 8

1/2

USER INTERFACE SUBS. (U) GENERAL ELECTRIC CO

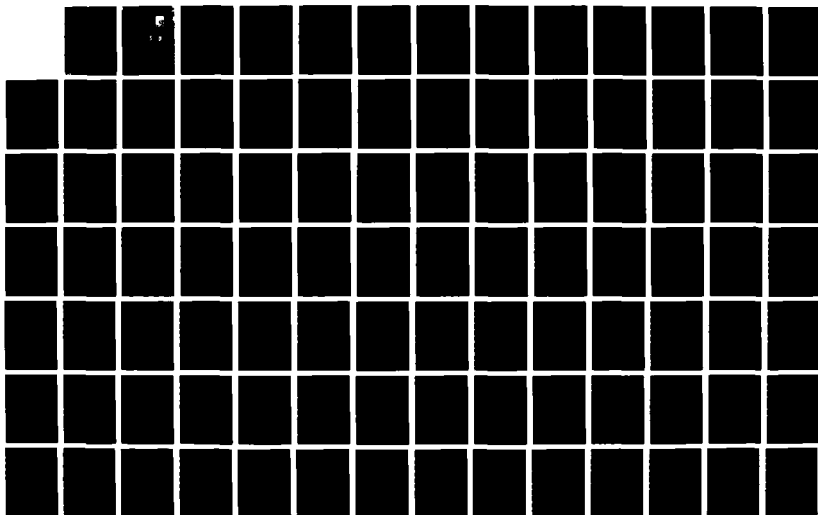
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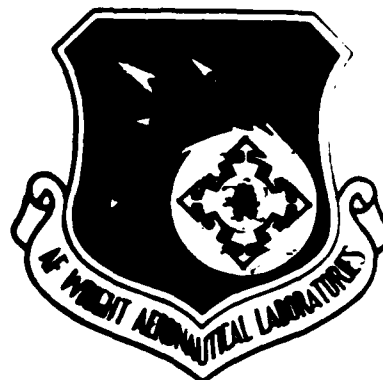




MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

AFVAL-TR-86-4006  
Volume VIII  
Part 21

**AD-A182 648**



INTEGRATED INFORMATION  
SUPPORT SYSTEM (IISS)  
Volume VIII - User Interface Subsystem  
Part 21 - Report Writer Product Specification  
Sections 3.10.9 - 4.2

General Electric Company  
Production Resources Consulting  
One River Road  
Schenectady, New York 12345

DTIC  
ELECTE  
JUL 20 1987  
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Final Report for Period 22 September 1980 - 31 July 1985  
November 1985

Approved for public release; distribution is unlimited.

MATERIALS LABORATORY  
AIR FORCE WRIGHT AERONAUTICAL LABORATORIES  
AIR FORCE SYSTEMS COMMAND  
WRIGHT-PATTERSON AFB, OH 45433-6533

Unclassified

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) This specification establishes the detailed design of a computer program identified as the Report Writer (RW). The RW is used to report selected information stored in the database accessible through the Common Data Model. The major functions of the RW are: 1) The placement and formatting of fixed textual information and database information (i.e., DCM data). 2) The summarization of simple statistical attributes of the reported information such as counts, sums, and averages. 3) The retrieval of data from the CDM.			
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Vol VIII - User Interface Subsystem  
Part 21 - Report Writer Product Specification  
Sections 3.10.9 - 4.2

A S D 86 1485  
17 Jul 1986



Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

## PREFACE

This product specification covers the work performed under Air Force Contract F33615-80-C-5155 (ICAM Project 6201). This contract is sponsored by the Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Gerald C. Shumaker, ICAM Program Manager, Manufacturing Technology Division, through Project Manager, Mr. David Judson. The Prime Contractor was Production Resources Consulting of the General Electric Company, Schenectady, New York, under the direction of Mr. Alan Rubenstein. The General Electric Project Manager was Mr. Myron Hurlbut of Industrial Automation Systems Department, Albany, New York.

Certain work aimed at improving Test Bed Technology has been performed by other contracts with Project 6201 performing integrating functions. This work consisted of enhancements to Test Bed software and establishment and operation of Test Bed hardware and communications for developers and other users. Documentation relating to the Test Bed from all of these contractors and projects have been integrated under Project 6201 for publication and treatment as an integrated set of documents. The particular contributors to each document are noted on the Report Documentation Page (DD1473). A listing and description of the entire project documentation system and how they are related is contained in document FTR620100001, Project Overview.

The subcontractors and their contributing activities were as follows:

### TASK 4.2

#### Subcontractors

#### Role

Boeing Military Aircraft  
Company (BMAC)

Reviewer.

D. Appleton Company  
(DACOM)

Responsible for IDEF support,  
state-of-the-art literature  
search.

General Dynamics/  
Ft. Worth

Responsible for factory view  
function and information  
models.

<u>Subcontractors</u>	<u>Role</u>
Illinois Institute of Technology	Responsible for factory view function research (IITRI) and information models of small and medium-size business.
North American Rockwell	Reviewer.
Northrop Corporation	Responsible for factory view function and information models.
Pritsker and Associates	Responsible for IDEF2 support.
SofTech	Responsible for IDEFO support.

TASKS 4.3 - 4.9 (TEST BED)

<u>Subcontractors</u>	<u>Role</u>
Boeing Military Aircraft Company (BMAC)	Responsible for consultation on applications of the technology and on IBM computer technology.
Computer Technology Associates (CTA)	Assisted in the areas of communications systems, system design and integration methodology, and design of the Network Transaction Manager.
Control Data Corporation (CDC)	Responsible for the Common Data Model (CDM) implementation and part of the CDM design (shared with DACOM).
D. Appleton Company (DACOM)	Responsible for the overall CDM Subsystem design integration and test plan, as well as part of the design of the CDM (shared with CDC). DACOM also developed the Integration Methodology and did the schema mappings for the Application Subsystems.

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1 November 1985

<u>Subcontractors</u>	<u>Role</u>
Digital Equipment Corporation (DEC)	Consulting and support of the performance testing and on DEC software and computer systems operation.
McDonnell Douglas Automation Company (McAuto)	Responsible for the support and enhancements to the Network Transaction Manager Subsystem during 1984/1985 period.
On-Line Software International (OSI)	Responsible for programming the Communications Subsystem on the IBM and for consulting on the IBM.
Rath and Strong Systems Products (RSSP) (In 1985 became McCormack & Dodge)	Responsible for assistance in the implementation and use of the MRP II package (PIOS) that they supplied.
SofTech, Inc.	Responsible for the design and implementation of the Network Transaction Manager (NTM) in 1981/1984 period.
Software Performance Engineering (SPE)	Responsible for directing the work on performance evaluation and analysis.
Structural Dynamics Research Corporation (SDRC)	Responsible for the User Interface and Virtual Terminal Interface Subsystems.

Other prime contractors under other projects who have contributed to Test Bed Technology, their contributing activities and responsible projects are as follows:

<u>Contractors</u>	<u>ICAM Project</u>	<u>Contributing Activities</u>
Boeing Military Aircraft Company (BMAC)	1701, 2201, 2202	Enhancements for IBM node use. Technology Transfer to Integrated Sheet Metal Center (ISMC).



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<u>Contractors</u>	<u>ICAM Project</u>	<u>Contributing Activities</u>
Control Data Corporation (CDC)	1502, 1701	IISS enhancements to Common Data Model Processor (CDMP).
D. Appleton Company (DACOM)	1502	IISS enhancements to Integration Methodology.
General Electric	1502	Operation of the Test Bed and communications equipment.
Hughes Aircraft Company (HAC)	1701	Test Bed enhancements.
Structural Dynamics Research Corporation (SDRC)	1502, 1701, 1703	IISS enhancements to User Interface/Virtual Terminal Interface (UI/VTI).
Systran	1502	Test Bed enhancements. Operation of Test Bed.

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FOREWORD

This is the second bound segment of two comprising Volume VIII, Part 21 of the Final Technical Report. It contains Sections 3.10.9 through 4.2.

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#### 3.10.9 Include File Descriptions

The following list contains a purpose and description of each include file listed in 3.10.4 as specified in the source code. The language it is written in is also given.

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REPORT WRITER Include File Description

FILE NAME: CHART  
PURPOSE: CHART INCLUDE FILE  
LANGUAGE: C

DESCRIPTION:  
-----

DESCRIPTION  
GLOBAL DECLARATIONS FOR CHART.

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REPORT WRITER Include File Description

FILE NAME: CTLCHR  
PURPOSE: CONTROL CHARACTERS  
LANGUAGE: C

DESCRIPTION:  
-----

DESCRIPTION  
DEFINITIONS OF ALL CONTROL CHARACTERS TO AVOID CHARACTER  
SET  
DEPENDENCIES.

PS 620144501  
1 November 1985

REPORT WRITER Include File Description

FILE NAME: ERRPRO  
PURPOSE: PROCESS ERROR INCLUDE FILE  
LANGUAGE: VAX-11 COBOL

DESCRIPTION:  
-----



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**REPORT WRITER Include File Description**

**FILE NAME:** FFFV2  
**PURPOSE:** FORM FILE FORMAT - VERSION 2  
**LANGUAGE:** C

**DESCRIPTION:**  
-----

**DESCRIPTION**  
**RECORD LAYOUTS FOR THE BINARY FORM DEFINITION FILE**

PS 620144501  
1 November 1985

**REPORT WRITER Include File Description**

**FILE NAME: FLAN**  
**PURPOSE: FLAN INTERNAL STRUCTURES**  
**LANGUAGE: C**

**DESCRIPTION:**  
-----

**DESCRIPTION**  
**AUXILIARY DATA STRUCTURES USED BY FLAN.**

PS 620144501  
1 November 1985

**REPORT WRITER Include File Description**

**FILE NAME:** FPCODE  
**PURPOSE:** FORM PROCESSOR RETURN CODES  
**LANGUAGE:** C

**DESCRIPTION:**  
-----

PS 620144501  
1 November 1985

REPORT WRITER Include File Description

FILE NAME: FPD  
PURPOSE: FORM PROCESSOR DATA  
LANGUAGE: C

DESCRIPTION:  
-----

DESCRIPTION  
DATA DEFINITIONS FOR ALL FORM PROCESSOR (INCLUDING  
MONITER)DATA.

PS 620144501  
1 November 1985

REPORT WRITER Include File Description

FILE NAME: FPDINI  
PURPOSE: FPD INITIALIZATION  
LANGUAGE: C

DESCRIPTION:  
-----

DESCRIPTION  
INITIALIZED VERSION OF UID FOR INCLUSION IN MAIN PROGRAM.

PS 620144501  
1 November 1985

**REPORT WRITER Include File Description**

**FILE NAME: FPPARM**  
**PURPOSE: FORM PROCESSOR PARAMETERS**  
**LANGUAGE: C**

**DESCRIPTION:**  
-----

**DESCRIPTION: THESE DATA DEFINITIONS ARE USED  
IN THE FORM PROCESSOR ROUTINES.**

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**REPORT WRITER Include File Description**

**FILE NAME:** HRWFRM  
**PURPOSE:** HRW FORM DEFINITION  
**LANGUAGE:** C

**DESCRIPTION:**  
-----

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1 November 1985

**REPORT WRITER Include File Description**

**FILE NAME: NTM**  
**PURPOSE: NTM INTERFACE INCLUDE FILE**  
**LANGUAGE: C**

**DESCRIPTION:**  
-----

**DESCRIPTION**  
**INCLUDE FILE FOR NTM INTERFACE**



PS 620144501  
1 November 1985

**REPORT WRITER Include File Description**

**FILE NAME:** RW  
**PURPOSE:** REPORT WRITER DEFINITIONS  
**LANGUAGE:** C

**DESCRIPTION:**  
-----

**DESCRIPTION**

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1 November 1985

REPORT WRITER Include File Description

FILE NAME: SRVRET  
PURPOSE: AS THE RETURN GIVEN A TABLE-FULL ERROR  
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

-----  
MODIFIED 11/2/83 TO INCLUDE RET-CODE-5 \*  
MODIFIED 1/9/84 TO INCREASE ALL ERROR CODES TO PIC X(5) \*  
AND TO ELIMINATE ALPHA'S \*  
MODIFIED 1/26/84 TO ADD RET-CODE FOR GETUSR-NOT-SUCC \*  
SRV-SUCCESSFUL ADDED FOR GENERIC RETURN \*  
MODIFIED 2/7/84 TO ADD ERROR CODES FOR ENTRY-NOT-FOUND \*  
MODIFIED 2/8/84 TO ADD WTHST-NOT-SUCCESSFUL \*  
MODIFIED 2/20/84 TO ADD TSTMOD NEW CODES. \*  
MODIFIED 20 AUG 84 INITIALIZE ALL LOCAL VARIABLES TO  
SPACES OR 0.  
MODIFIED 5/21/85 TO ADD RCL AND FILGEN RETURN CODES

REPORT WRITER Include File Description

FILE NAME: STDTP  
PURPOSE: STANDARD TYPE DEFINITIONS  
LANGUAGE: C

DESCRIPTION:  
-----

DESCRIPTION

THIS FILE ENSURES THAT THE FOLLOWING STANDARD TYPES ARE  
AVAILABLE:

Float	- SINGLE PRECISION Float
DOUBLE	- DOUBLE PRECISION Float
LONG	- 32 BIT (OR LARGER) SIGNED INTEGER
LBITS	- 32 BITS (OR MORE) FOR BIT MANIPULATION
INT	- NATURAL SIZE SIGNED INTEGER
UNSIGNED	- NATURAL SIZE UNSIGNED INTEGER
BOOL	- NATURAL SIZE LOGICAL (ZERO / NON-ZERO ONLY)
SHORT	- 16 BIT (OR LARGER) SIGNED INTEGER
USHORT	- 16 BIT (OR LARGER) UNSIGNED INTEGER
BITS	- 16 BITS (OR MORE) FOR BIT MANIPULATION
CHAR	- SINGLE MACHINE CHARACTER (REAL CHARACTERS ALWAYS POSITIVE)
TINY	- 8 BIT (OR LARGER) SIGNED INTEGER
UTINY	- 8 BIT (OR LARGER) UNSIGNED INTEGER
TBITS	- 8 BITS (OR MORE) FOR BIT MANIPULATION
TBOOL	- 8 BIT (OR LARGER) LOGICAL (ZERO / NON-ZERO ONLY)
METACHAR	- 16 BIT (OR LARGER) AUGMENTED CHARACTER (SIGNED)
VOID	- FUNCTION THAT RETURNS NO VALUE
FORTTRAN	- STORAGE CLASS FOR FOREIGN (NON-C) ROUTINES OR C ROUTINES WHICH ARE CALLABLE FROM FOREIGN ROUTINES

SINCE NOT ALL COMPILERS SUPPORT USHORT, TINY, AND UTINY,  
THE FUNCTIONS

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USHORT(), TINY(), AND UTINY() SHOULD BE USED WHENEVER  
REFERENCING THEM.

IN ADDITION, THE FOLLOWING UTILITY MACROS ARE DEFINED:

LURSHIFT(N, B) - UNSIGNED LONG RIGHT SHIFT  
MAX(A, B) - MAXIMUM OF A AND B  
MIN(A, B) - MINIMUM OF A AND B

REPORT WRITER Include File Description

ABS(A)	- ABSOLUTE VALUE OF A
STRASN(A, B)	- TRANSPORTABLE A = B FOR STRUCTURES
NULL	- NULL POINTER VALUE (0)
TRUE	- 1
FALSE	- 0
SUCCESS	- EXIT(SUCCESS) INDICATES SUCCESSFUL COMPLETION
FAILURE	- EXIT(FAILURE) INDICATES ERRORS

THE FOLLOWING SYMBOLS SHOULD BE DEFINED BASED ON THE  
COMPILER BEING USED:

USHORT	- COMPILER SUPPORTS UNSIGNED SHORT
TINY	- COMPILER TREATS CHAR AS SIGNED
UTINY	- CHAR IS SIGNED AND COMPILER SUPPORTS UNSIGNED CHAR
VOID	- COMPILER SUPPORTS VOID
FORTRAN	- COMPILER SUPPORTS FORTRAN
STRASN	- DEFINE APPROPRIATE MACRO
SUCCESS	- DEFINE APPROPRIATE VALUE IF NOT 0
FAILURE	- DEFINE APPROPRIATE VALUE IF NOT 1

### 3.10.10 Hierarchy Chart

The following hierarchy charts show the relationships between all of the modules mentioned in the above documentation. A module may call a subroutine several times within its code, but the call will only be shown once as a single relationship on this hierarchy chart. All modules shown at the top of the first page are considered Main Programs as described in section 3.10.1 above.

There is an internal paging scheme as marked by the numbers in the upper right corner of each page. An index after the last page of the chart shows where a routine and its calls are first defined. If a routine has no page reference, it either makes no calls or is an external routine. A continuation box on the end of a tree limb shows where that the tree continues on the page numbered mentioned. A number in a box with a routine name points to the page where the routine is further defined within the hierarchy tree. If there is no number in a box, the routine either makes no calls or is an external routine.

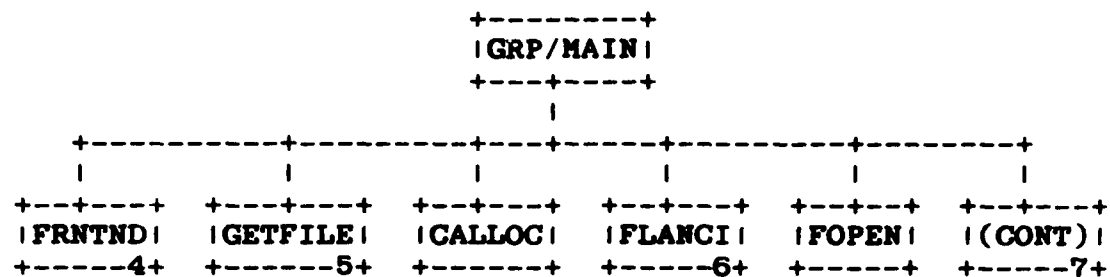
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1

```
+-----+ +-----+ +-----+
|GRP/MAIN| |HRW/MAIN| |PRNT|
+-----2+ +-----3+ +-----+
      |
      +-----+
      |         |
+-----+ +-----+
|PRINTF| |PRNT|
+-----+ +-----1+
```

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2





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3

```
      +-----+
      |HRW/MAIN|
      +-----+
      |
+-----+-----+-----+-----+-----+-----+
| | | | | |
+-----+-----+-----+-----+-----+-----+
|INITAL| |INITFP| |ADDFRM| |GDATA| |ESCPY| |(CONT)|
+-----+-----+-----+-----+-----+-----+
                                     +-----8+
```

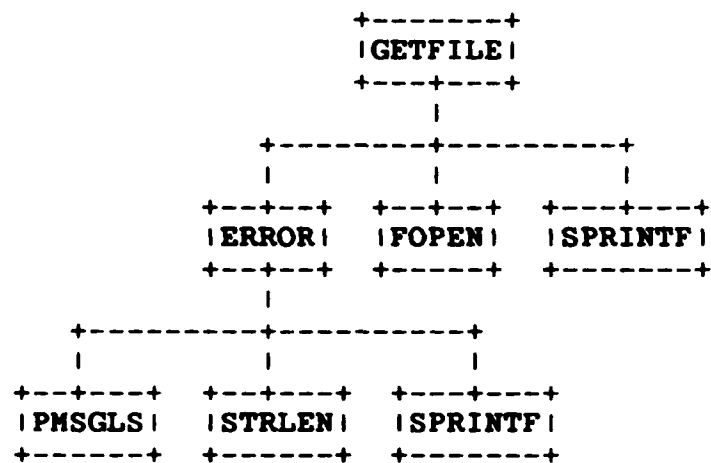
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4

```
      +-----+  
      |FRNTND|  
      +-----+  
      |  
+-----+-----+-----+-----+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
|STRCHR| |INITAL| |MEMCMP| |TRMNAT| |PMSGLC| |(CONT)|  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
                                         +-----9+
```

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5



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6

```
      +-----+
      |FLANGI|
      +-----+
        |
      +-----+
      |         |
      +-----+ +-----+
      |YYPARSE| |DELFLD|
      +-----+ +-----+
        |
+-----+-----+-----+-----+-----+
|         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|PRINTF| |STRUPC| |STRNCPY| |FREE| |STRCAT| |(CONT)|
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
                                         +-----10+
```

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7

```
      +-----+
      |GRP/MAIN|
      +-----+
      |
+-----+-----+-----+-----+-----+
|         |         |         |         |         |
+-----+-----+-----+-----+-----+
| (CONT) | |STRCAT| |STRCPY| |WRTFRM| |RWOPN| | (CONT) |
+-----2+ +-----+ +-----+ +-----11+ +-----12+ +-----13+
```

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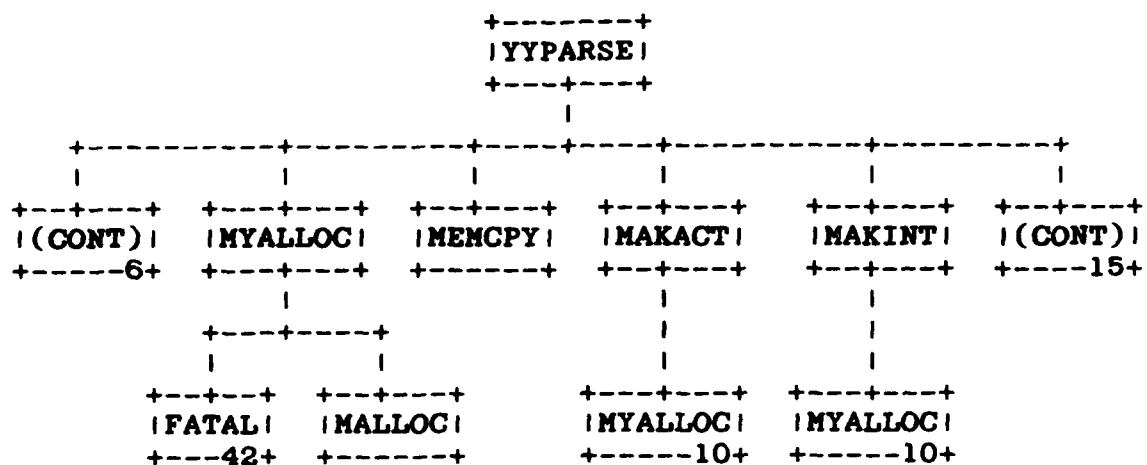
8

```
      +-----+
      |HRW/MAIN|
      +-----+
        |
+-----+-----+-----+-----+-----+
|         |         |         |         |         |
+---+---+ +---+---+ +---+---+ +---+---+ +---+---+ +---+---+
| (CONT) | | FOPEN | | ATOI  | | MEMCMP| | PMSGLS| | (CONT) |
+---+---+ +---+---+ +---+---+ +---+---+ +---+---+ +---+---+
| 3      | |       | |       | |       | |       | | 14    |
```

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9

```
      +-----+  
      |FRNTND|  
      +-----+  
      |  
+-----+-----+-----+-----+-----+-----+  
|         |         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
| (CONT) | |INITFP| |ADDFRM| |GDATA| |OISCR| |SPRINTF|  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
|  -4  | |         | |         | |         | |         | |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
```





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11

```

+-----+
| WRTFRM |
+-----+
|
+-----+-----+-----+-----+-----+-----+
|         |         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|SPRINTF| |FOPEN| |SYSMSG| |FWRITE| |FCLOSE| |(CONT)|
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+

```

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12

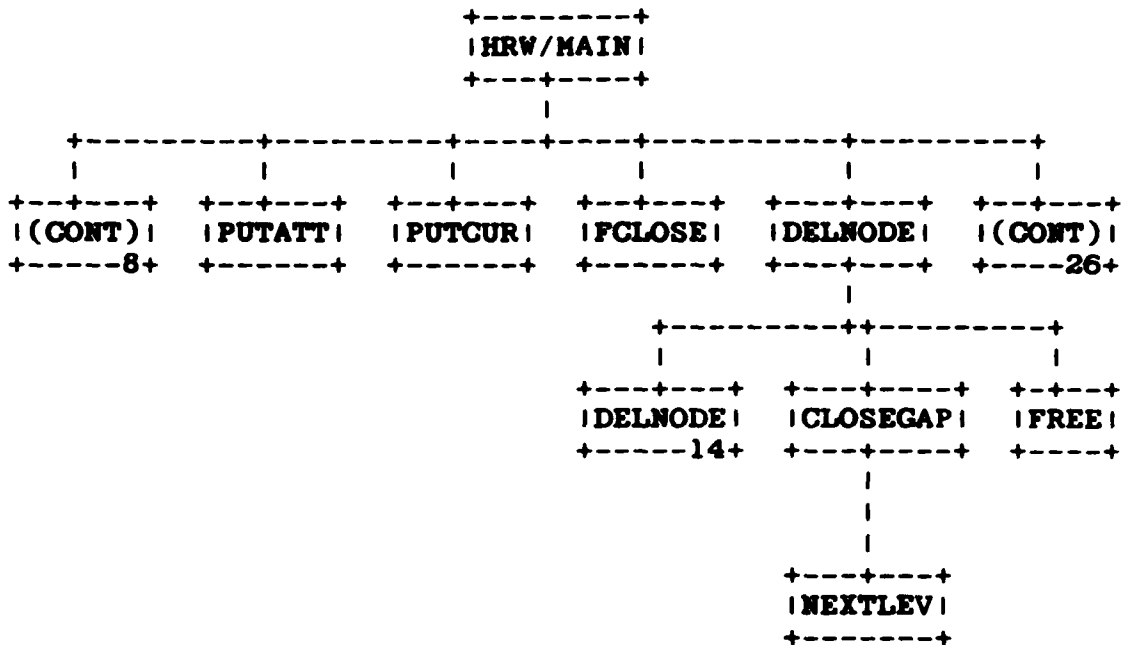
```
      +-----+  
      |RWOPN|  
      +---+---+  
      |  
+-----+-----+-----+-----+  
| | | | |  
+---+---+ +---+---+ +---+---+ +---+---+ +---+---+  
|RWEXPD| |MLPFRM| |WINRSV| |FLDRSV| |TRGRSV|  
+---17+ +---18+ +---19+ +---20+ +---21+
```

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13

```

+-----+
|GRP/MAIN|
+-----+
|
+-----+
|
|
+-----+
| (CONT) | | GENMAIN | | BLDSUB | | GENACT | | GENPAG | | (CONT) |
+-----7+ +-----22+ +-----23+ +-----24+ +-----25+
|
|
+---+
|GEN|
+--22+
```



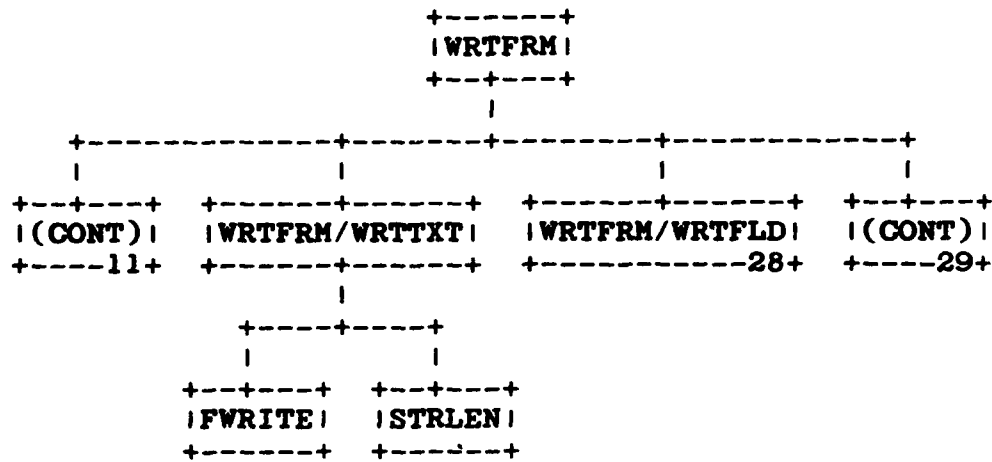
```

+-----+
|YYPARSE|
+-----+
|
+-----+
|          |          |          |          |
+-----+ +-----+ +-----+ +-----+ +-----+
|(CONT)| |STRCMP| |STRLEN| |WARNING| |(CONT)|
+-----10+ +-----+ +-----+ +-----+ +-----27+
|
+-----+
|          |          |          |
+-----+ +-----+ +-----+
|PMSGLS| |STRLEN| |SPRINTF|
+-----+ +-----+ +-----+

```

PS 620144501  
1 November 1985

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PS 620144501  
1 November 1985

17

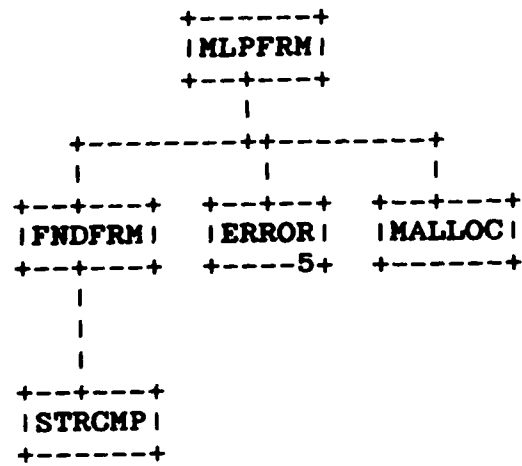
```

      +-----+
      |RWEXPD|
      +-----+
      |
      +-----+-----+-----+-----+
      |               |               |               |               |
      +-----+ +-----+ +-----+ +-----+ +-----+
      |COPFLD| |ABS| |FNDATT| |STRASN| |RWSP/FIXFRM|
      +-----+ +-----+ +-----84+ +-----+ +-----+
                                     |
                                     +-----+-----+-----+-----+
                                     |               |               |               |
                                     +-----+ +-----+ +-----+ +-----+
                                     |RWEXPD| |COPFLD| |FNDATT| |STRCMP|
                                     +-----17+ +-----+ +-----84+ +-----+

```

PS 620144501  
1 November 1985

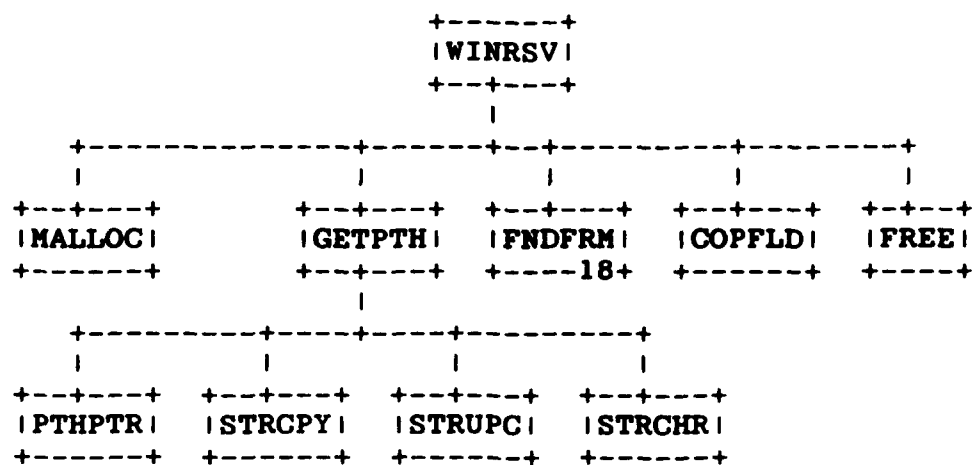
18





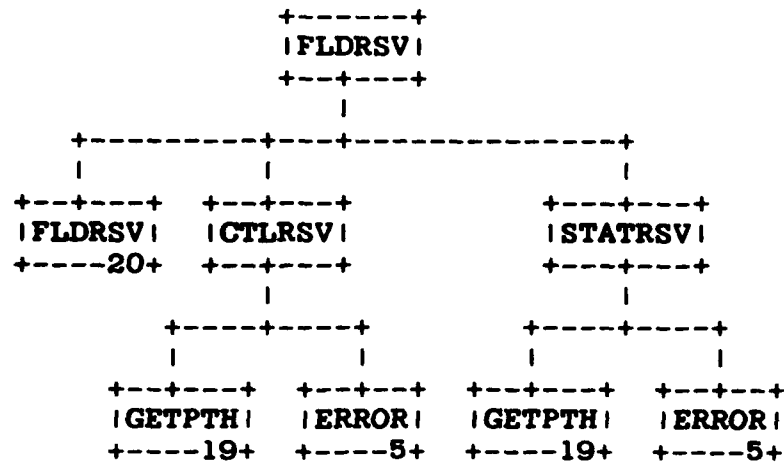
PS 620144501  
1 November 1985

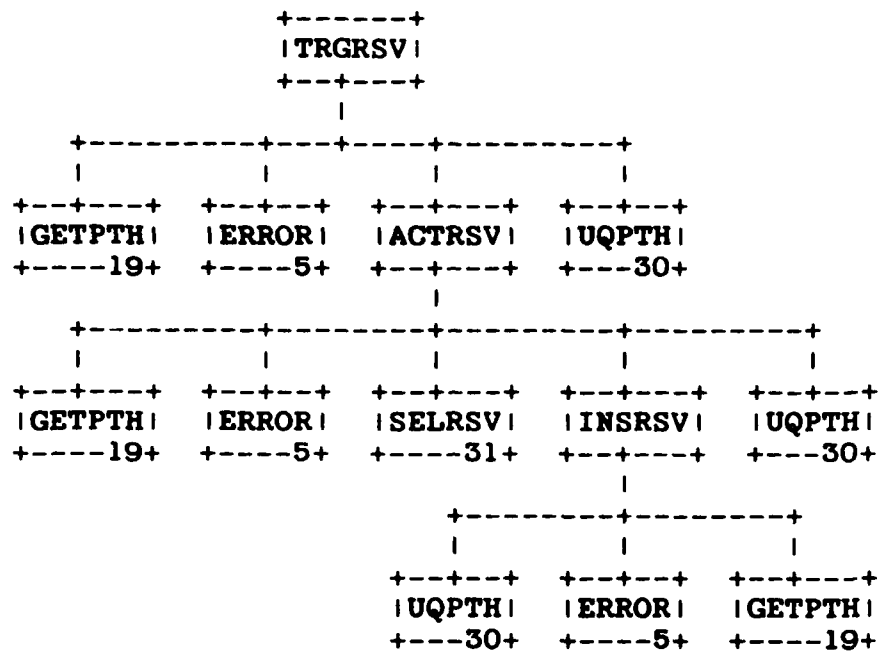
19



PS 620144501  
1 November 1985

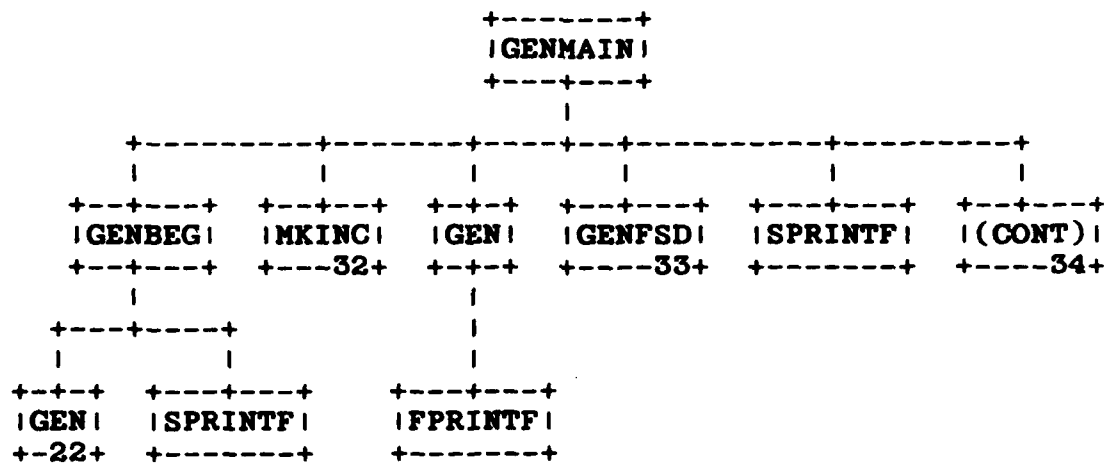
20





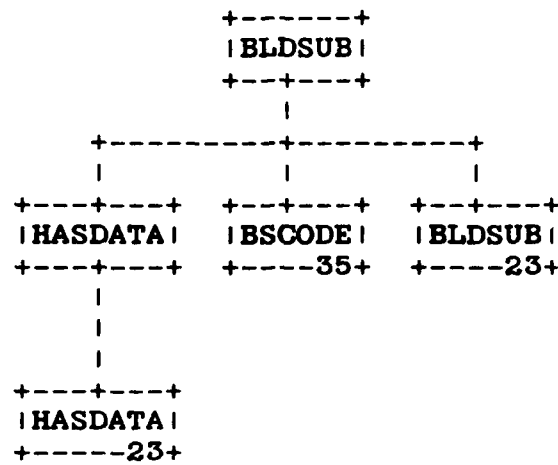
PS 620144501  
1 November 1985

22



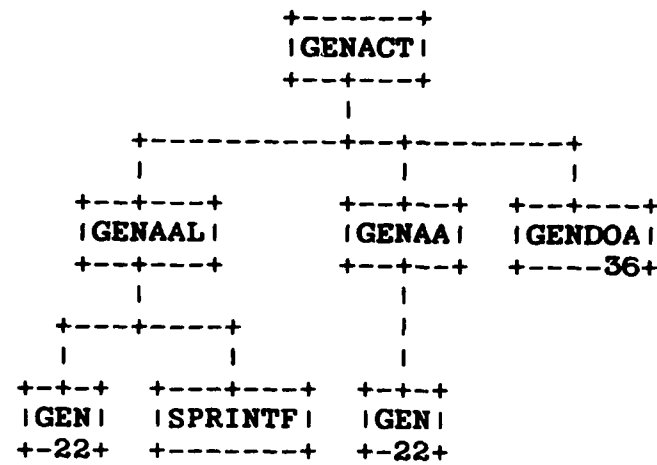
PS 620144501  
1 November 1985

23



PS 620144501  
1 November 1985

24



PS 620144501  
1 November 1985

25

```

+-----+
|GRP/MAIN|
+-----+
|
+-----+-----+-----+-----+-----+
|      |      |      |      |      |      |
+-----+-----+-----+-----+-----+
|(CONT)| |NDMLGEN| |PMSGLC| |OISCR| |TERMFP| |(CONT)|
+-----13+ +-----37+ +-----+ +-----+ +-----+ +-----38+

```

PS 620144501  
1 November 1985

26

```
      +-----+
      |HRW/MAIN|
      +-----+
        |
+-----+-----+-----+-----+-----+
|         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | |TERMFP| |TRMNAT| |READTREE| |REPOS| | (CONT) |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|  -14  | |  -39  | |  -40  | |  -41  |
+-----+ +-----+ +-----+ +-----+
```



PS 620144501  
1 November 1985

27

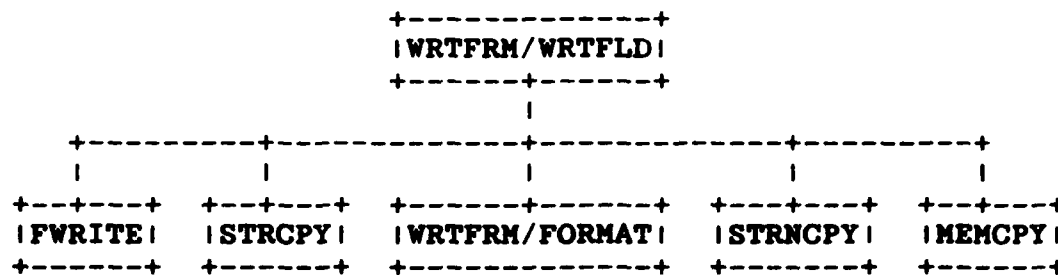
```

+-----+
|YYPARSE|
+-----+
|
+-----+-----+-----+-----+-----+
|           |           |           |           |           |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | | SPRINTF | | MKPOS | | FATAL | | STRCPY | | (CONT) |
+-----15+ +-----+ +-----+ +-----42+ +-----+ +-----43+
|
|
+-----+
|MYALLOC|
+-----10+

```

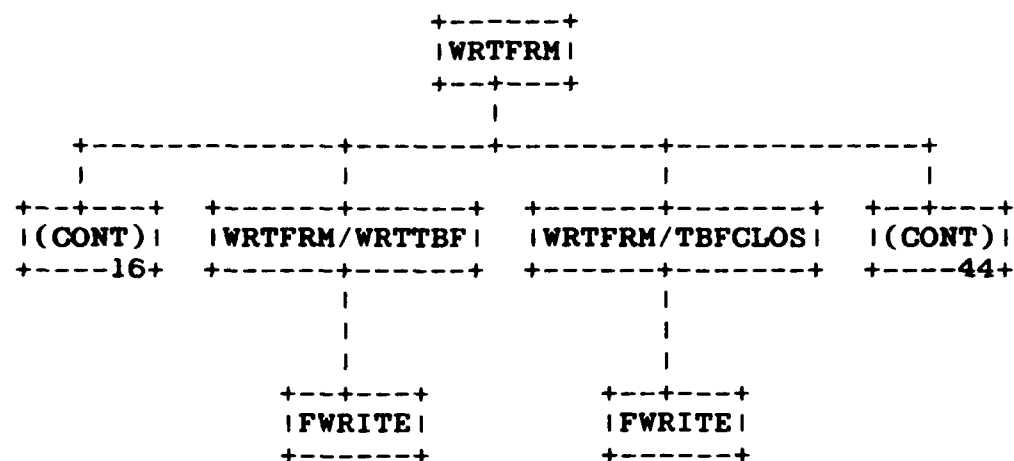
PS 620144501  
1 November 1985

28



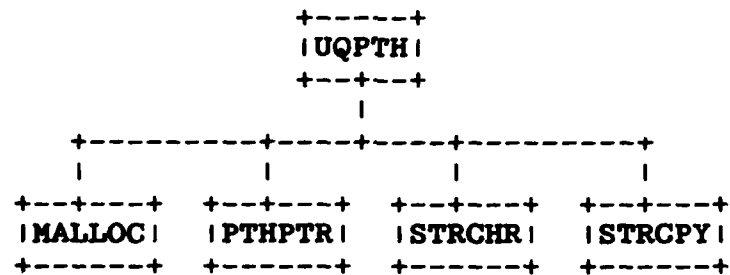
PS 620144501  
1 November 1985

29



PS 620144501  
1 November 1985

30



PS 620144501  
1 November 1985

31

```
      +-----+  
      |SELRSV|  
      +---+---+  
      |  
+-----+-----+-----+-----+  
|         |         |         |         |  
+---+---+ +---+---+ +---+---+ +---+---+  
|SELRSV| |UQPTH| |ERROR| |GETPTH|  
+---31+ +---30+ +---5+ +---19+
```

PS 620144501  
1 November 1985

32

```
      +-----+
      |MKINC|
      +-----+
      |
+-----+-----+-----+-----+-----+-----+
|         |         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|MKINC| |HASITEM| |SPRINTF| |STRLEN| |BLEN| |GEN| |ERROR|
+---32+ +-----+ +-----+ +-----+ +-----+ +---22+ +---5+
|         |
|         |
+-----+
|HASITEM|
+-----32+
```

PS 620144501  
1 November 1985

33

```
+-----+  
| GENFSD |  
+-----+  
|  
+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
| ISOPNE | | HASITEM | | SPRINTF | | STRLEN | | GEN | | (CONT) |  
+-----+ +-----32+ +-----+ +-----+ +-----22+ +-----45+
```

PS 620144501  
1 November 1985

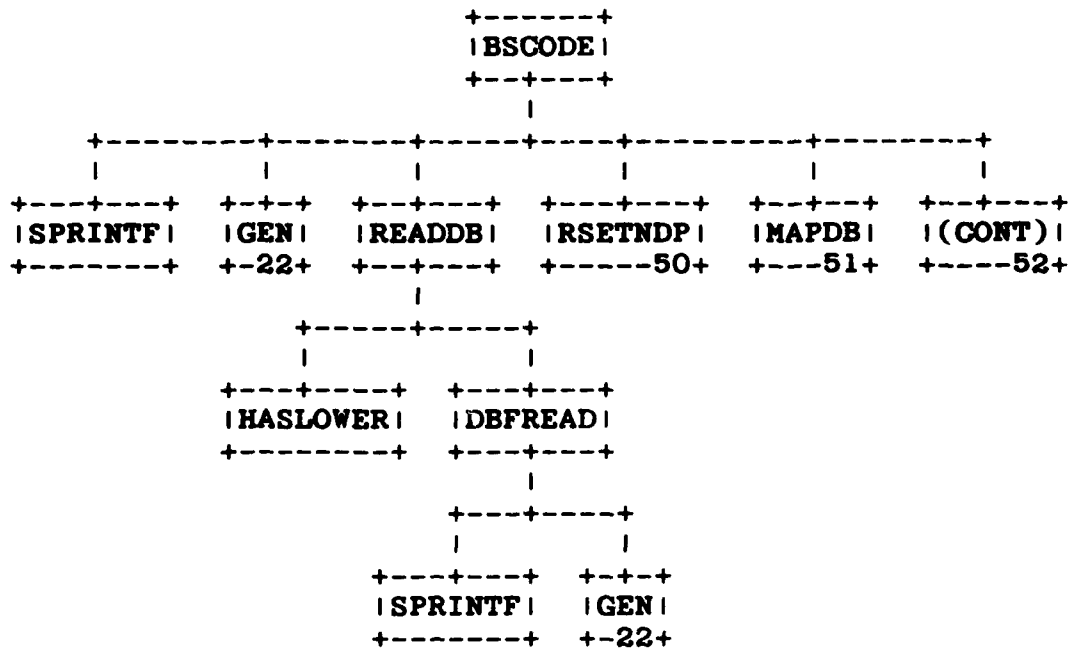
34

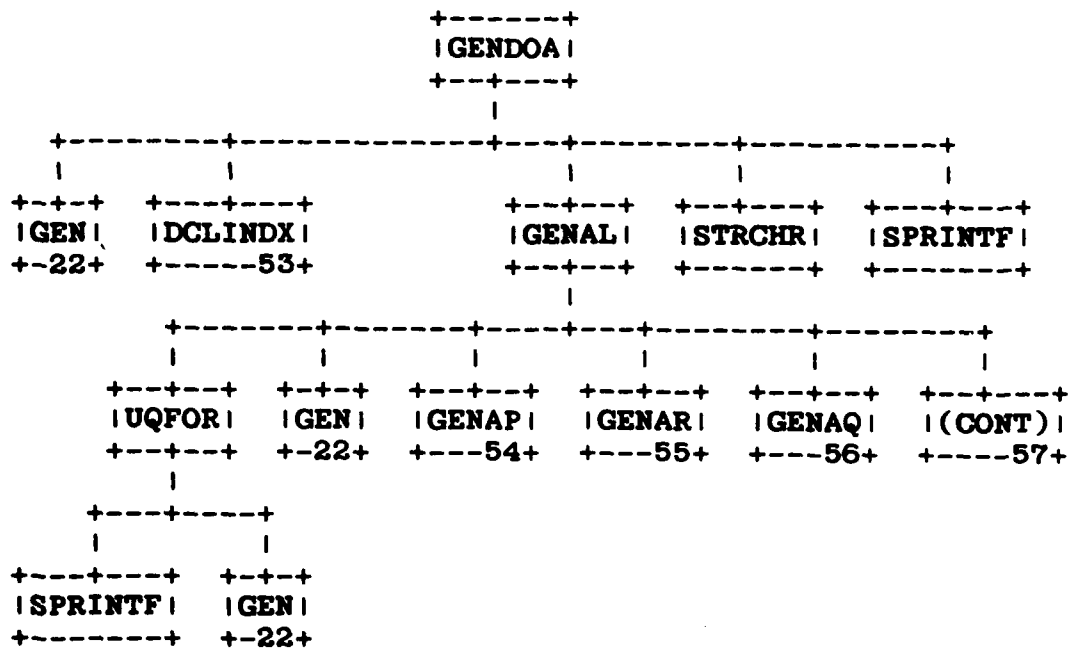
```

+-----+
| GENMAIN |
+-----+
|
+-----+-----+-----+-----+-----+
| | | | | |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | | GENFS | | GENFP | | GENNDP | | GENCHG | | (CONT) |
+-----22+ +-----46+ +-----47+ +-----48+ +-----49+
|
|
+-----+
| |
+-----+ +-----+
| SPRINTF | | GEN |
+-----+ +-----22+

```







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1 November 1985

37

```
+-----+  
|NDMLGEN|  
+-----+  
|  
+-----+  
|          |          |          |          |          |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
|STRNCPY| |SPRINTF| |FOPEN| |SYSMSG| |STDCODE| |FCLOSE|  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
+-----+58+ +-----+
```

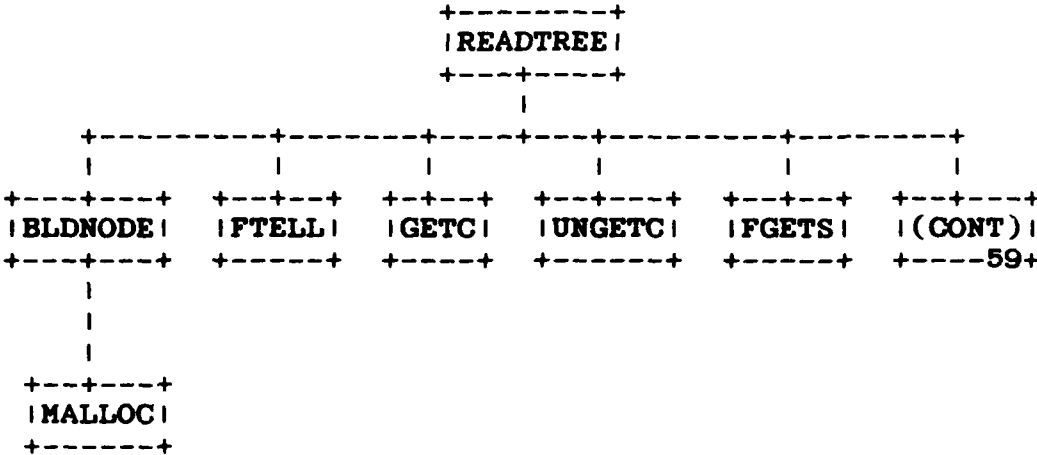
PS 620144501  
1 November 1985

38

```
      +-----+
      |GRP/MAIN|
      +-----+
        |
+-----+-----+
|         |         |
+-----+ +-----+ +-----+
| (CONT) | |TRMNDML| |STRCHR|
+-----+ +-----+ +-----+
      -25+
```

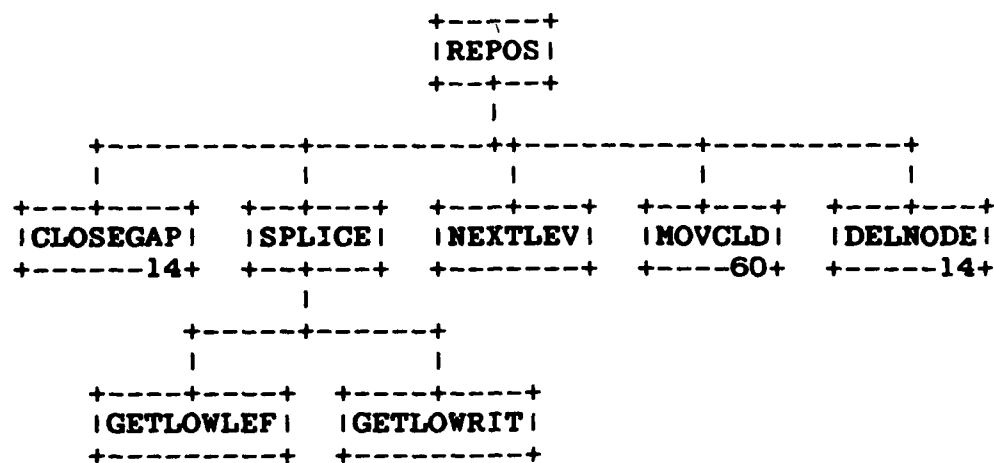
PS 620144501  
1 November 1985

39



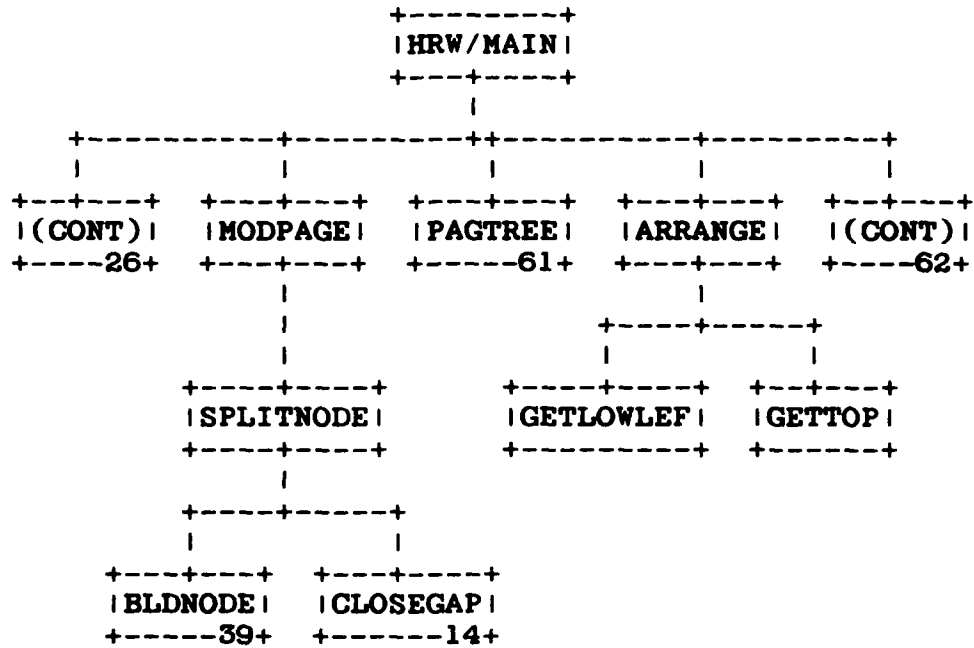
PS 620144501  
1 November 1985

40



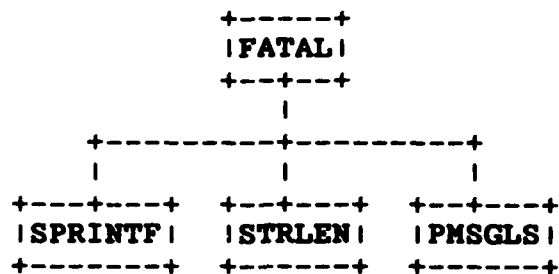
PS 620144501  
1 November 1985

41



PS 620144501  
1 November 1985

42





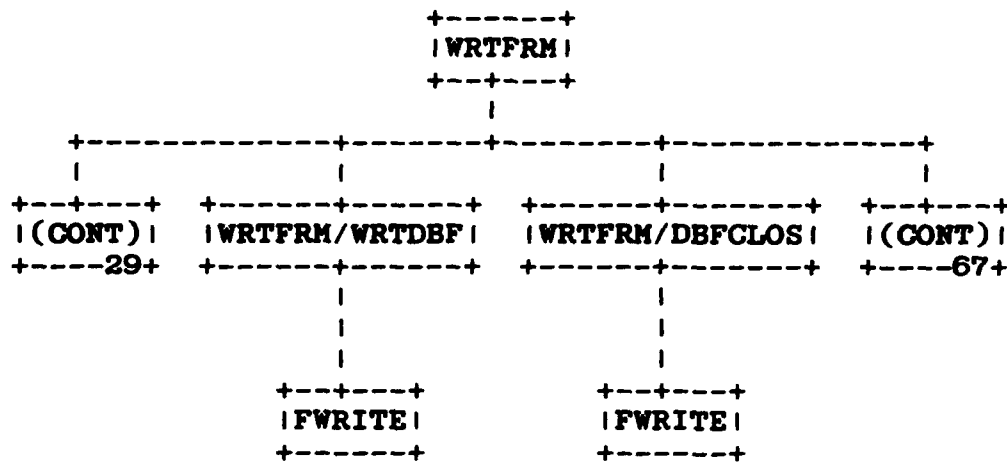
PS 620144501  
1 November 1985

43

```

+-----+
|YYPARSE|
+-----+
|
+-----+-----+-----+-----+-----+
|           |           |           |           |           |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|(CONT)| |CHKFLD| |CHKFRM| |STRCHR| |ERROR| |(CONT)|
+-----27+ +-----63+ +-----+ +-----+ +-----5+ +-----64+
|
+-----+-----+-----+-----+-----+
|           |           |           |           |           |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|WARNING| |ADDCHK| |CHKARY| |ABS| |STRLEN| |(CONT)|
+-----15+ +-----+ +-----65+ +-----+ +-----+ +-----66+
|
+-----+-----+
|           |
+-----+ +-----+
|FLDTYP| |ERROR|
+-----+ +-----5+

```



PS 620144501  
1 November 1985

45

```
      +-----+
      | GENFSD |
      +-----+
        |
    +-----+
    |         |
    |         |         |
+---+---+ +---+---+ +---+---+
| (CONT) | | GENFSD | | MAKQR |
+---33+ +---33+ +---+---+
        |
    +-----+-----+-----+
    |         |         |         |
+---+---+ +---+---+ +---+---+ +---+---+
| STRCAT | | STRCPY | | SPRINTF | | ISOPNE |
+---+---+ +---+---+ +---+---+ +---+---+
```

46



PS 620144501  
1 November 1985

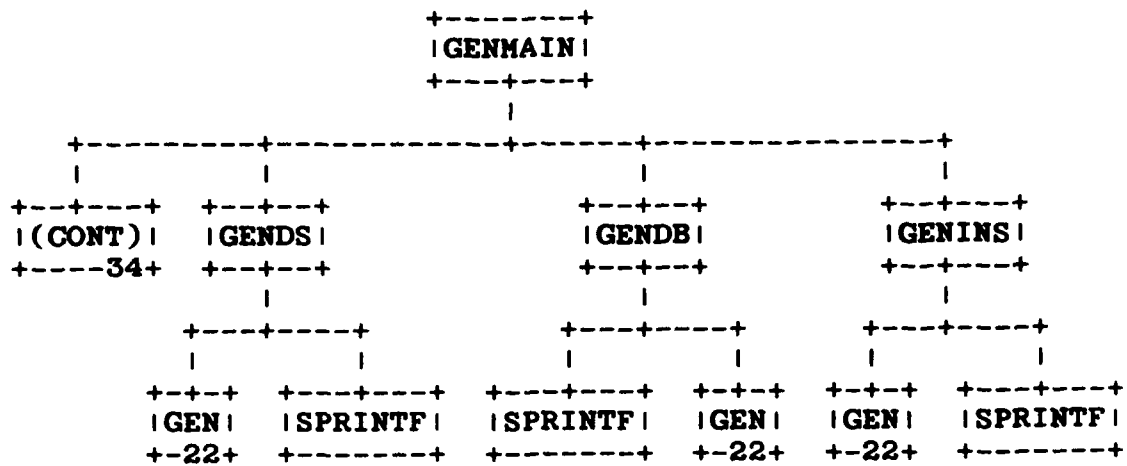
47

```
+-----+  
| GENFP |  
+---+---+  
|  
+---+---+  
|           |  
+---+---+ +---+  
| SPRINTF | | GEN |  
+-----+ +--22+
```

PS 620144501  
1 November 1985

48

```
+-----+  
|GENNDP|  
+---+---+  
|  
+---+---+  
|           |  
+---+---+ +---+  
|SPRINTF| |GEN|  
+---+---+ +---22+
```



PS 620144501  
1 November 1985

50

```
      +-----+  
      |RSETNDP|  
      +-----+  
      |  
+-----+-----+-----+-----+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
|RSETNDP| |MAKQR| |SPRINTF| |STRLEN| |GEN| |HASDATA|  
+-----50+ +---45+ +-----+ +-----+ +-22+ +-----23+
```



PS 620144501  
1 November 1985

51

```
      +-----+  
      |MAPDB|  
      +---+---+  
      |  
+-----+-----+-----+-----+  
|         |         |         |         |  
+---+---+ +---+---+ +---+---+ +---+---+ +---+  
|STRCHR| |MAKQR| |SPRINTF| |STRLEN| |GEN|  
+---+---+ +---45+ +---+---+ +---+---+ +---22+
```

PS 620144501  
1 November 1985

52

```

+-----+
|BSCODE|
+-----+
|
+-----+-----+-----+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+
|(CONT)| |VISITA| |HASITEM| |SETNDP|
+-----35+ +-----68+ +-----32+ +-----+
|
+-----+-----+-----+-----+-----+-----+
|         |         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|SETNDP| |MAQQR| |SPRINTF| |STRLEN| |GEN| |HASDATA|
+-----52+ +-----45+ +-----+ +-----+ +-----22+ +-----23+

```

PS 620144501  
1 November 1985

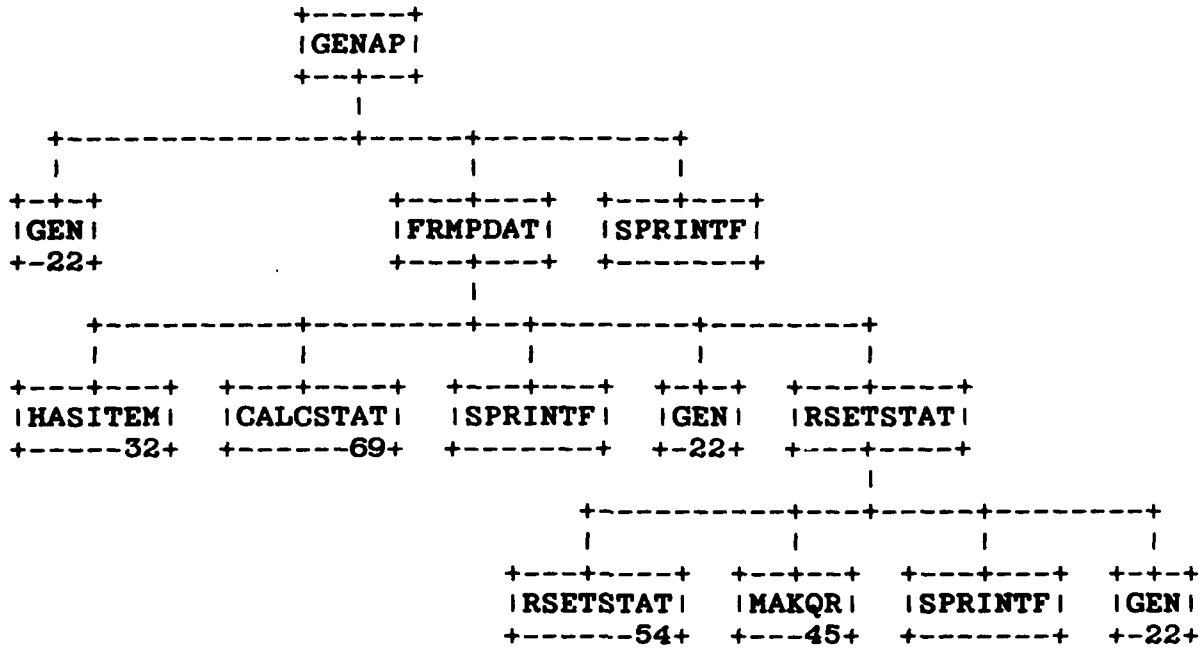
53

```

+-----+
| DCLINDX |
+-----+
      |

```

MAX	STRCPY	SPRINTF	STRLEN	STRCAT	GEN
22					



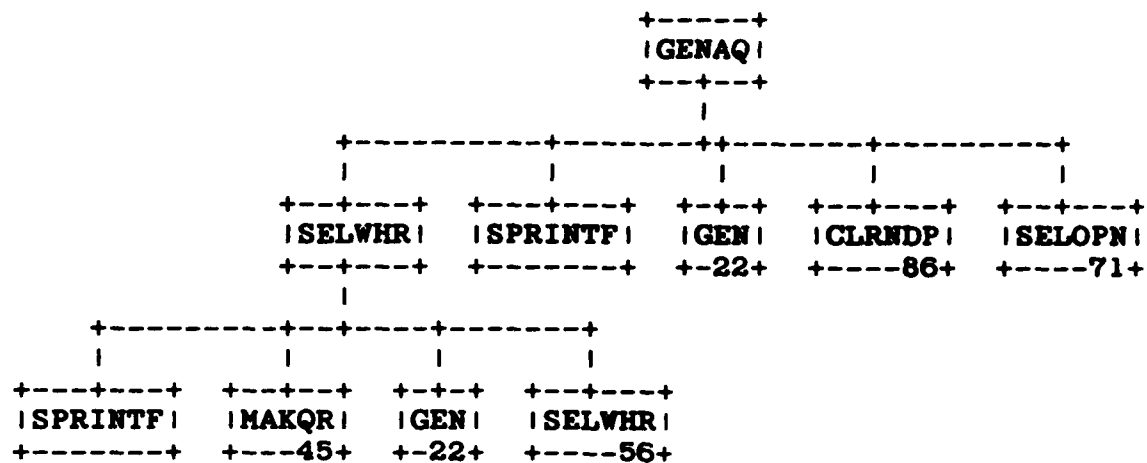
PS 620144501  
1 November 1985

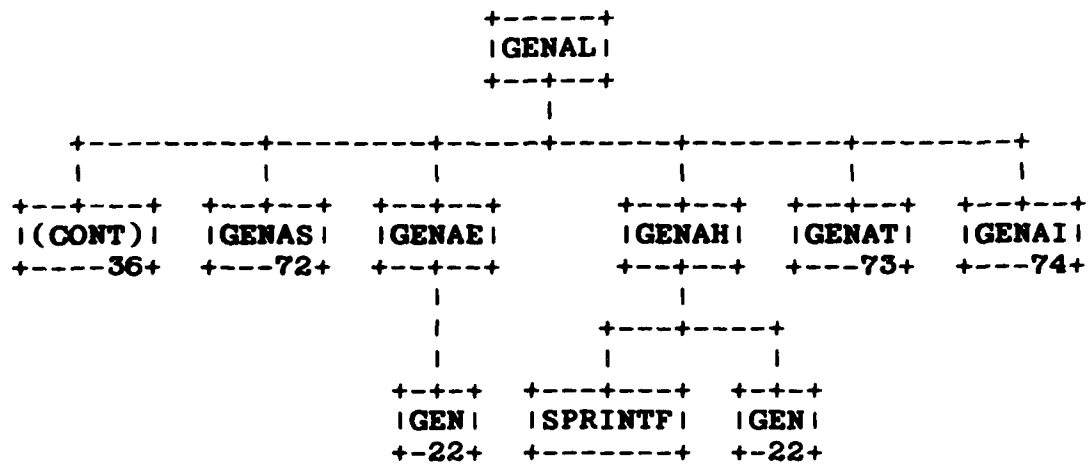
55

```
      +-----+  
      | GENAR |  
      +---+---+  
      |  
+-----+-----+-----+-----+-----+  
| FNDFRM | | GEN | | ISOPNE | | HASDATA | | HASITEM | | (CONT) |  
+-----18+ +---22+ +-----+ +-----23+ +-----32+ +-----70+
```

PS 620144501  
1 November 1985

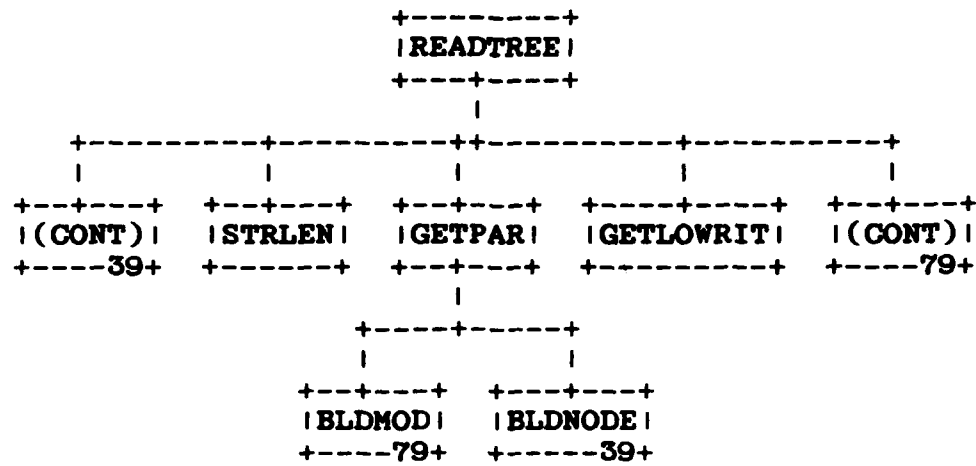
56





```
      +-----+
      |STDCODE|
      +-----+
      |
+-----+-----+-----+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+
|ENDGEN| |SELECT| |SPRINTF| |PROCGEN| |(CONT)|
+-----75+ +-----76+ +-----77+ +-----78+
```

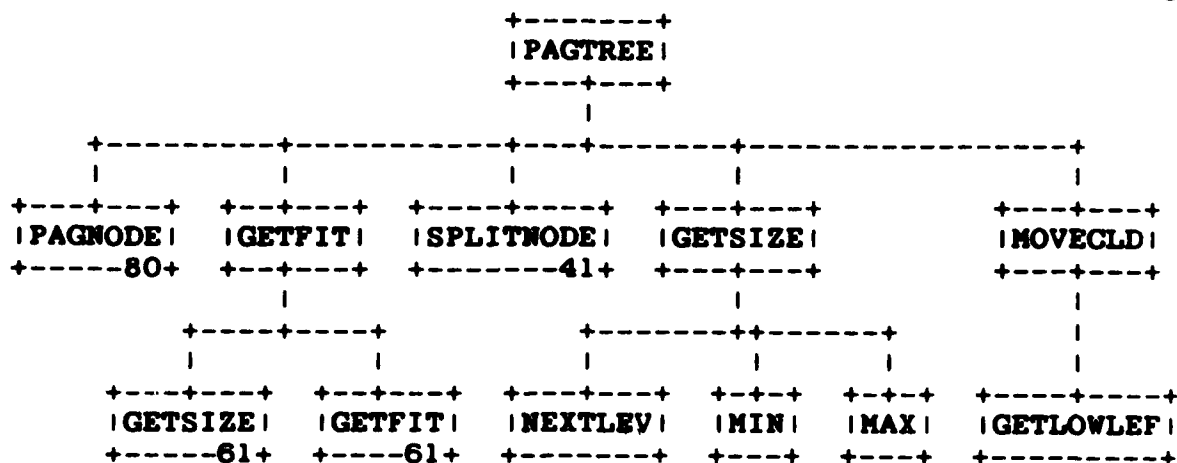




PS 620144501  
1 November 1985

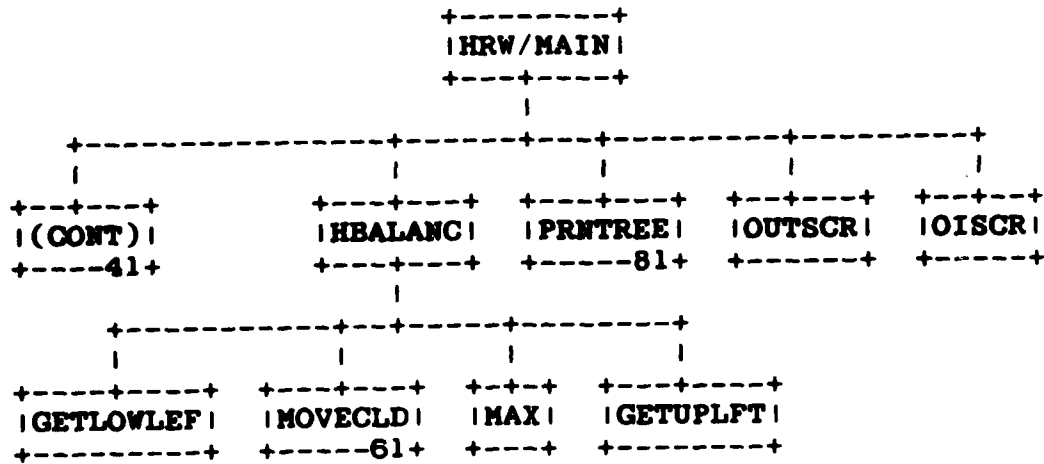
60

```
      +-----+
      |MOVCLD|
      +-----+
      |
+-----+-----+-----+-----+
|         |         |         |         |
+-----+-----+-----+-----+
|BLDNODE| |CLOSEGAP| |SPLICE| |DELNODE|
+-----39+ +-----14+ +-----40+ +-----14+
```



PS 620144501  
1 November 1985

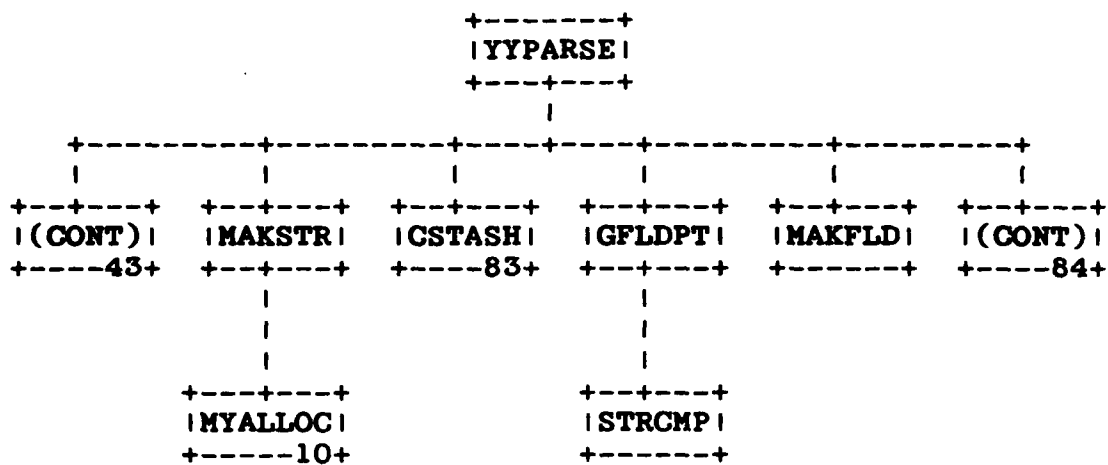
62



PS 620144501  
1 November 1985

63

```
      +-----+
      |CHKFLD|
      +-----+
      |
+-----+-----+-----+-----+-----+
|         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|FNDATT| |ERROR| |MEMSET| |MAX| |FREE| |(CONT)|
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|      84| |      5| |      | |      | |      | |      82|
```



PS 620144501  
1 November 1985

65

```
      +-----+  
      |CHKARY|  
      +-----+  
      |  
+-----+-----+  
|          |          |  
+-----+-----+ +-----+ +-----+  
|MYALLOC| |ABS| |STRASN|  
+-----10+ +-----+ +-----+
```

PS 620144501  
1 November 1985

66

+-----+  
|CHKFRM|  
+-----+

|

+-----+					
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
(CONT)	FREE	FLDTYP	ERROR	GFLDPT	(CONT)
+-----43+	+-----+	+-----+	+-----5+	+-----64+	+-----85+



PS 620144501  
1 November 1985

67

```
      +-----+  
      |WRTFRM|  
      +-----+  
      |  
+-----+-----+-----+-----+  
|         |         |         |         |  
+-----+ +-----+ +-----+ +-----+  
|(CONT)| |STRASN| |STRCPY| |STRLEN|  
+-----+ +-----+ +-----+ +-----+
```

PS 620144501  
1 November 1985

68

```
      +-----+  
      |VISITA|  
      +-----+  
      |  
+-----+-----+-----+-----+-----+  
|      |      |      |      |      |      |  
+-----+-----+-----+-----+-----+  
|VISITA| |HASDATA| |GEN| |MAKQR| |HASITEM| |(CONT)|  
+-----+-----+-----+-----+-----+  
+-----68+ +-----23+ +-----22+ +-----45+ +-----32+ +-----86+
```

NO-A192 648

INTEGRATED INFORMATION SUPPORT SYSTEM (IISS) VOLUME 8 2/2  
USER INTERFACE SUBS. (U) GENERAL ELECTRIC CO  
SCHENECTADY NY PRODUCTION RESOURCES CONSU..

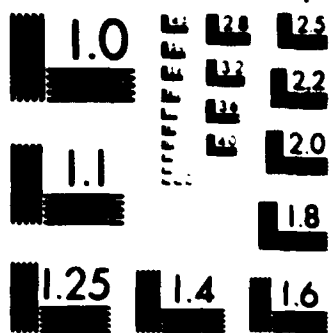
UNCLASSIFIED

C MORENC ET AL. 01 NOV 85 PS-620144501

F/G 12/5

NL

ENV  
8 87  
DTIC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

69

```

+-----+
| CALCSTAT |
+-----+
      |
+-----+-----+-----+-----+
|               |               |               |
+-----+ +-----+ +-----+ +-----+
| CALCSTAT | | MAKOR | | SPRINTF | | GEN |
+-----69+ +-----45+ +-----+ +-----22+

```

PS 620144501  
1 November 1985

70

```
      +-----+
      | GENAR |
      +-----+
      |
+-----+-----+-----+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+
| (CONT) | | STRCMP | | FRMPDAT | | SPRINTF |
+-----55+ +-----+ +-----54+ +-----+
```

PS 620144501  
1 November 1985

71

```

      +-----+
      |SELOPN|
      +-----+
        |
+-----+-----+-----+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+
|SPRINTF| |GEN|    |DBFREAD| |SELOPN|
+-----+ +-----+ +-----+ +-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+

```

PS 620144501  
1 November 1985

72

```
      +-----+  
      | GENAS |  
      +-----+  
      |  
+-----+-----+-----+-----+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
| ISOPNE | | MAKQR | | STRCPY | | SPRINTF | | GEN | | (CONT) |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
              +---45+              +---22+              +---87+
```



PS 620144501  
1 November 1985

73

```
      +-----+
      | GENAT |
      +-----+
        |
+-----+-----+
|         |         |
+-----+-----+ +-----+
| WARNING | | SPRINTF | | GEN |
+-----15+ +-----+ +--22+
```

PS 620144501  
1 November 1985

74

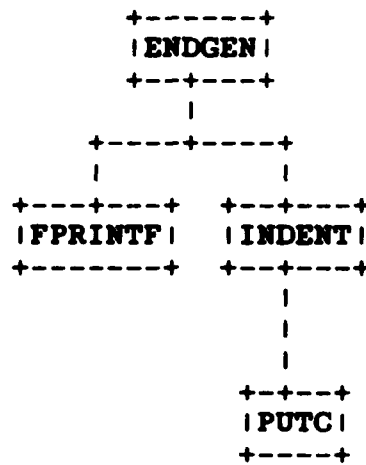
```

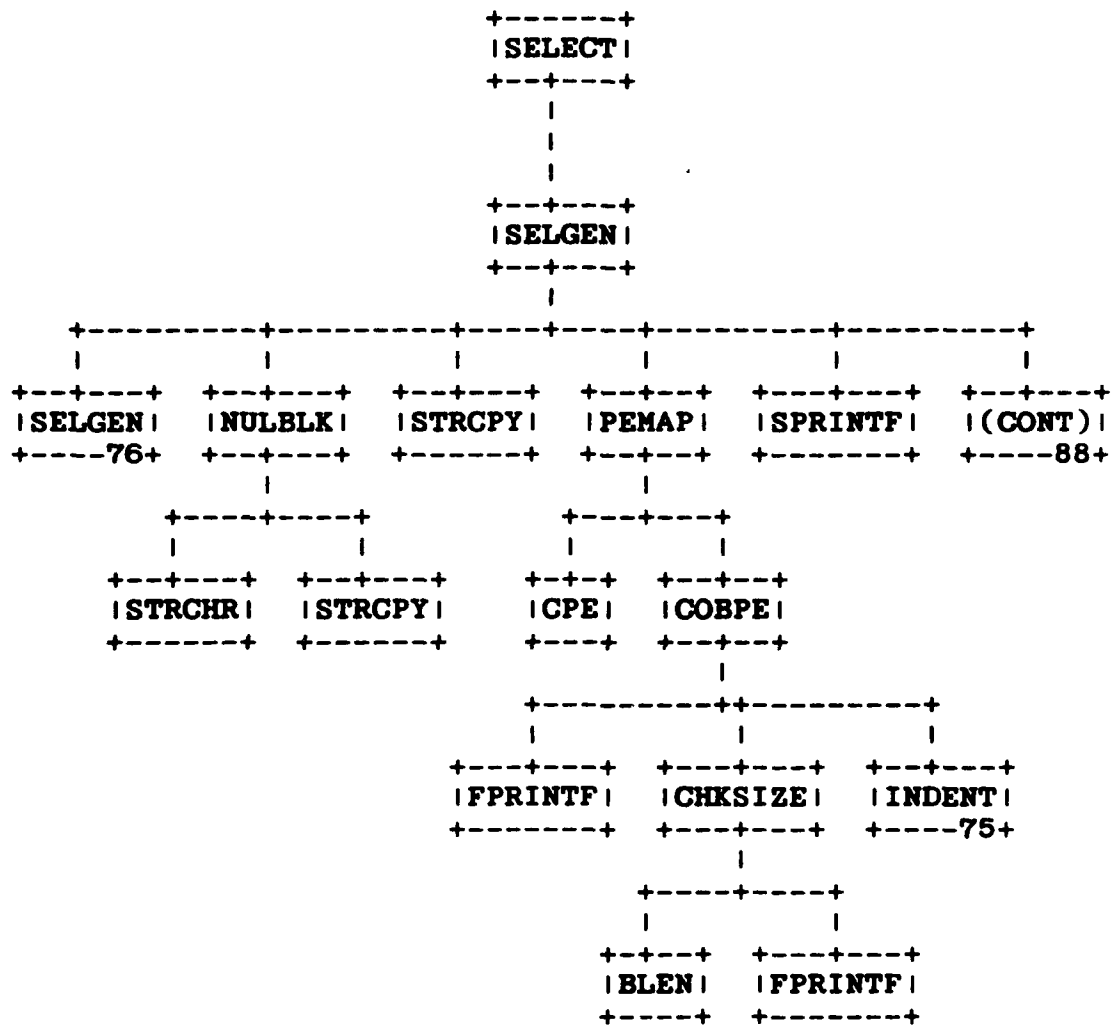
      +---+
      |GENAI|
      +---+
        |
+-----+
|       |       |
+---+ +---+ +---+
|MAQR| |SPRINTF| |GEN|
+---45+ +---+ +---22+

```

PS 620144501  
1 November 1985

75





```

+-----+
| PROCEN |
+-----+
|
+-----+-----+-----+-----+-----+
| | | | | |
+---+ +---+ +---+ +---+ +---+ +---+
| MAP | | USING | | OPNFIL | | NDMLLAB | | CLSFIL | | (CONT) |
+---+ +---+ +---+ +---+ +---+ +---+
| | | | | |
+-----+ +-----+
| | | |
+---+ +---+ +---+ +---+
| INDENT | | FPRINTF | | INDENT | | FPRINTF |
+---+75+ +---+ +---+75+ +---+

```

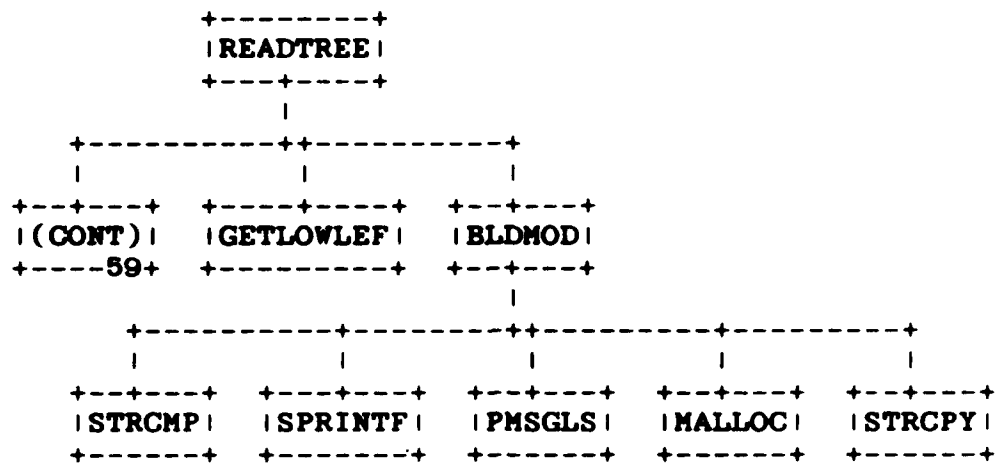
PS 620144501  
1 November 1985

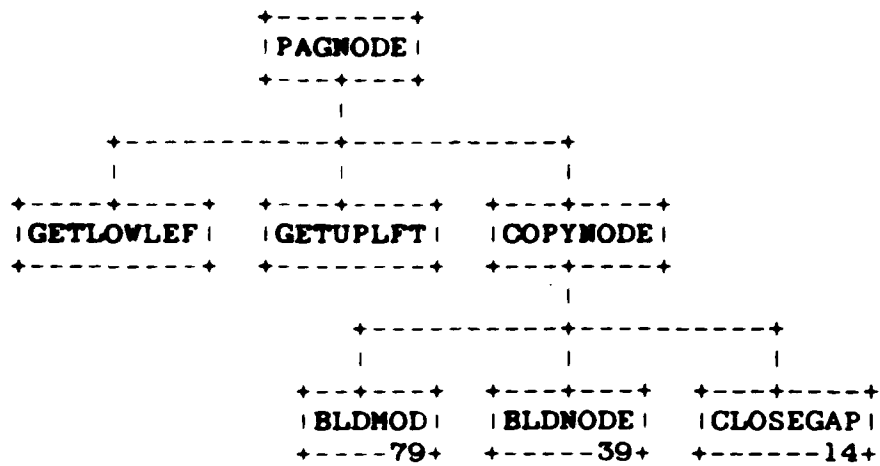
78

```

+-----+
|STDCODE|
+-----+
|
+-----+-----+-----+-----+
|
|
+-----+ +-----+ +-----+ +-----+ +-----+
|(CONT)| |FPRINTF| |DATAGEN| |STRUPC| |INSERT|
+-----58+ +-----+ +-----+ +-----+ +-----92+
|
+-----+-----+-----+-----+
|
|
+-----+ +-----+ +-----+ +-----+ +-----+
|NDMLLNK| |FILELNK| |INDENT| |FPRINTF| |(CONT)|
+-----93+ +-----+ +-----75+ +-----+ +-----94+
|
+-----+-----+
|
|
+-----+ +-----+
|INDENT| |FPRINTF|
+-----75+ +-----+

```







PS 620144501  
1 November 1985

81

```
      +-----+
      | PRNTREE |
      +-----+
        |
+-----+-----+-----+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+
| FPRINTF | | GETSIZE | | PUTC  | | GETLOWLEF | | (CONT) |
+-----+ +-----+61+ +-----+ +-----+ +-----+95+
```

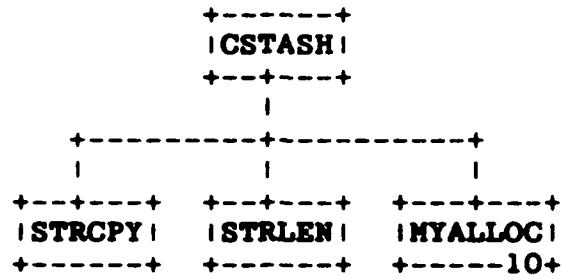
PS 620144501  
1 November 1985

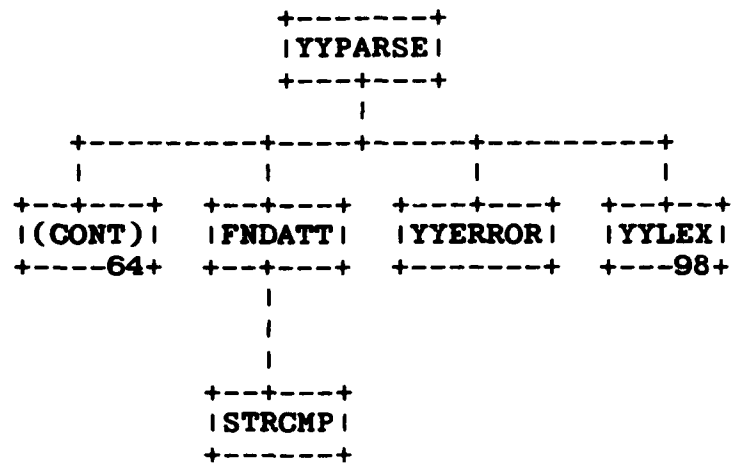
82

```
      +-----+  
      |CHKFLD|  
      +-----+  
      |  
+-----+-----+-----+-----+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
| (CONT) | |WRTEXP| |ELEN| |MEMCPY| |SYSMSG| | (CONT) |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
|      63 | |      96 | |      97 | |      98 | |      99 | |     00 |
```

PS 620144501  
1 November 1985

83

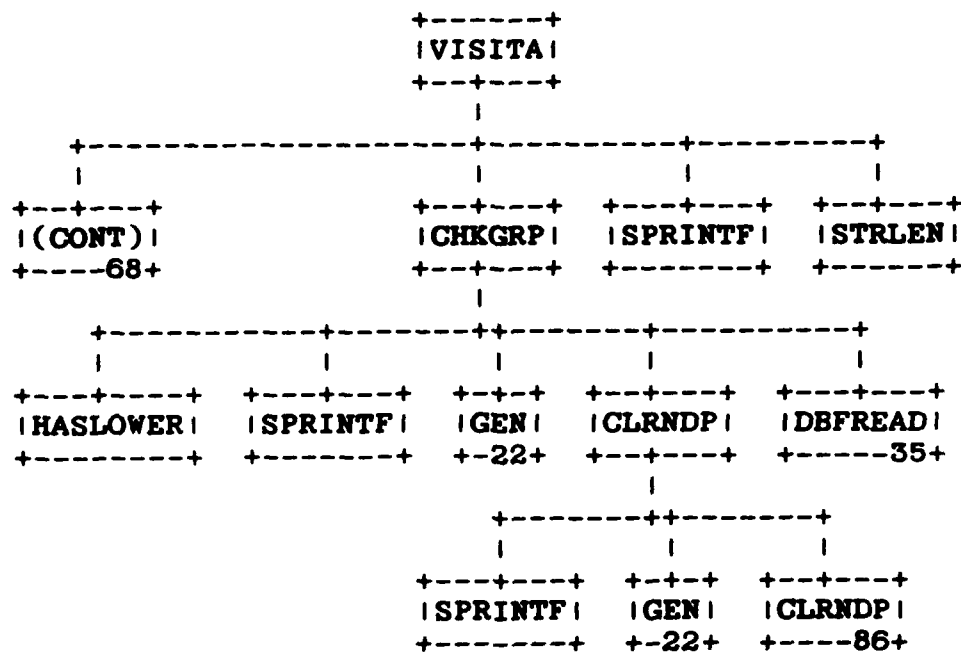




PS 620144501  
1 November 1985

85

```
      +-----+  
      |CHKFRM|  
      +---+---+  
      |  
+-----+-----+-----+-----+  
|      |      |      |      |  
+---+---+ +---+ +---+ +---+---+ +---+---+  
|(CONT)| |ABS| |MAX| |STRASN| |FNDATT|  
+---66+ +---+ +---+ +---+---+ +---84+
```



PS 620144501  
1 November 1985

87

```
      +-----+
      | GENAS |
      +-----+
        |
+-----+-----+
|         |         |
+-----+ +-----+ +-----+
| (CONT) | | STRSPN | | STRLEN |
+-----+ +-----+ +-----+
| 72     | |         | |         |
+-----+ +-----+ +-----+
```

PS 620144501  
1 November 1985

88

```

+-----+
|SELGEN|
+-----+
|
+-----+
|         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|(CONT)| |DASH| |GETTBL| |GETCOL| |OPNFIL| |(CONT)|
+-----76+ +-----92+ +-----+ +-----92+ +-----89+ +-----99+
|
+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+
|STRCHR| |ESCPY| |NULBLK| |STRCMP| |STRCPY|
+-----+ +-----+ +-----76+ +-----+ +-----+

```



PS 620144501  
1 November 1985

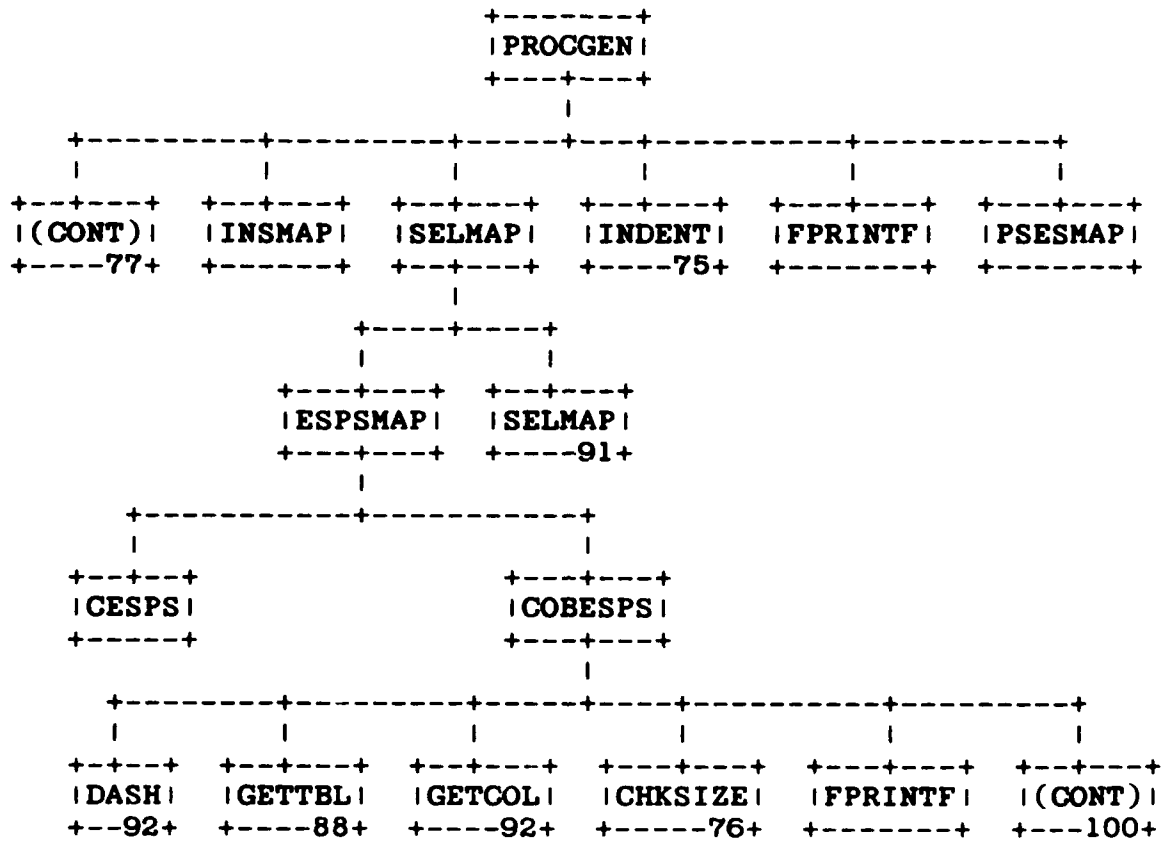
89

```
      +-----+
      |OPNFIL|
      +---+---+
          |
      +-----+---+-----+
      |           |           |
+---+---+ +---+---+ +---+---+
|INDENT| |FPRINTF| |OPNFIL|
+---75+ +---+---+ +---89+
```

PS 620144501  
1 November 1985

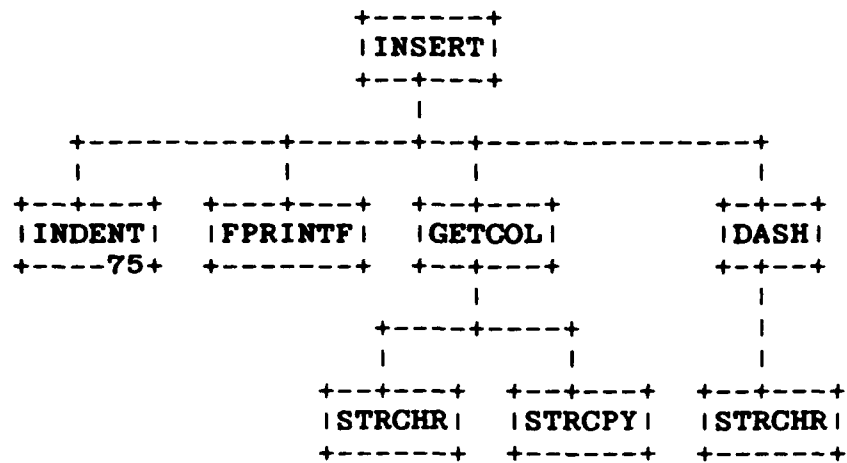
90

```
      +-----+
      |CLSFIL|
      +-----+
        |
    +-----+
    |         |
    |         |
+---+---+ +---+---+ +---+---+
|CLSFIL| |FPRINTF| |INDENT|
+---90+ +---+ +---75+
```



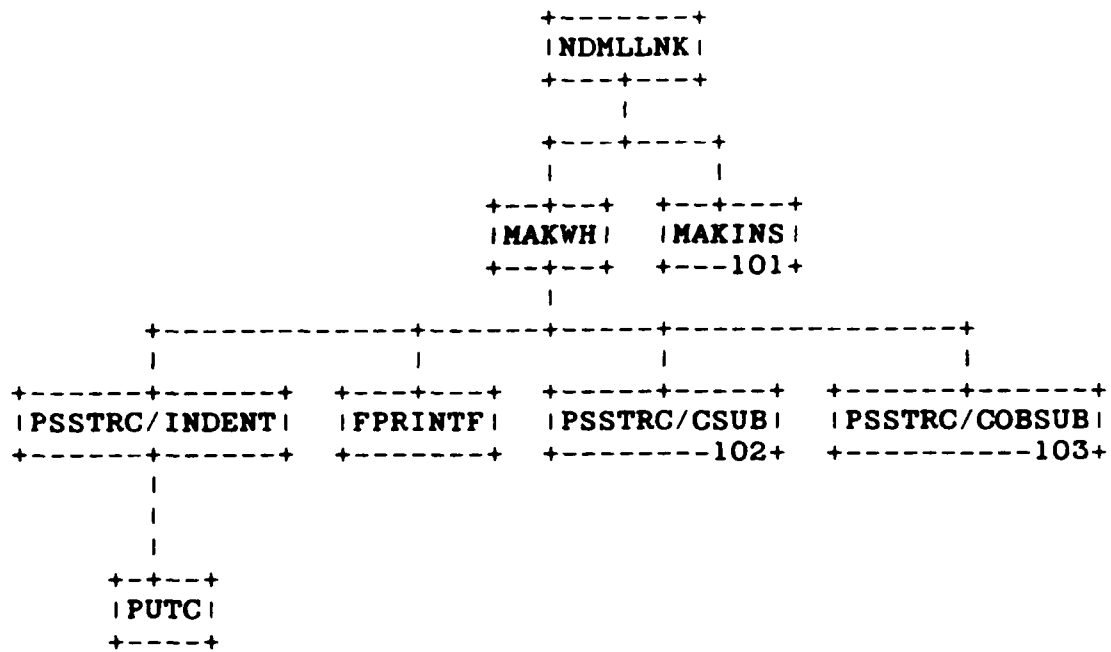
PS 620144501  
1 November 1985

92



PS 620144501  
1 November 1985

93



PS 620144501  
1 November 1985

94

```
      +-----+
      |DATAGEN|
      +-----+
      |
      +-----+-----+-----+-----+
      |         |         |         |         |
+---+---+ +---+---+ +---+---+ +---+ +---+---+
| (CONT) | |SELWS| |INSWS| |FD| |ASSIGN|
+---78+ +---104+ +---105+ 106+ +---+---+
      |
      +-----+-----+
      |         |         |
+---+---+ +---+---+
|FPRINTF| |INDENT|
+---+---+ +---75+
```

PS 620144501  
1 November 1985

95

```

+-----+
| PRNTREE |
+-----+
|
+-----+
|
|
+-----+
| (CONT) | | STRIPLEV | | DRAWLEV | | DOINDEX | | (CONT) |
+-----81+ +-----107+ +-----108+ +-----109+ +-----110+
```

PS 620144501  
1 November 1985

96

```
      +-----+
      |WRTEXP|
      +-----+
      |
+-----+-----+-----+-----+-----+
|+---+|+---+|+---+|+---+|+---+|+---+| | | | | |
|FREE| |WRTEXP| |MEMCPY| |MYALLOC| |STRLEN| |SPRINTF|
|+---+|+---+96+|+---+|+---+10+|+---+|+---+|
```



PS 620144501  
1 November 1985

97

```
+-----+  
|CHKFLD|  
+-----+  
|  
+-----+  
|           |           |  
+-----+ +-----+ +-----+  
| (CONT) | |MYALLOC| |STRLEN|  
+-----+ +-----+ +-----+  
|      82 | |      10 | |      |
```

PS 620144501  
1 November 1985

98

```

+-----+
| YLEX |
+-----+
|
+-----+-----+-----+-----+-----+
| | | | | |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| GETC | | ERROR | | ISALNUM | | ISDIGIT | | FATAL | | (CONT) |
+-----+ +-----5+ +-----+ +-----+ +-----42+ +-----111+

```

PS 620144501  
1 November 1985

99

```
+-----+
|SELGEN|
+---+---+
|
+-----+
|           |
+---+---+ +---+---+ +---+---+
| (CONT) | |FPRINTF| |INDENT|
+---88+ +---+ +---75+
```

PS 620144501  
1 November 1985

100

```
+-----+
|COBESPS|
+-----+
|
+-----+
|
+-----+
| (CONT) | |ESPSMAP/INDENT|
+-----+ +-----+
| -91 | |
+-----+
|
+-----+
| PUTC |
+-----+
```

PS 620144501  
1 November 1985

101

```
      +-----+  
      |MAKINS|  
      +-----+  
      |  
+-----+-----+-----+-----+  
|         |         |         |         |  
+-----+-----+-----+-----+  
|PSSTRC/INDENT| |FPRINTF| |PSSTRC/CSUB| |PSSTRC/COBSUB|  
+-----+-----+-----+-----+  
|          93| |          | |        102| |        103|
```

PS 620144501  
1 November 1985

102

```
+-----+
|PSSTRC/CSUB|
+-----+
|
+-----+
|
|
+-----+
|BLEN| |FPRINTF| |PSSTRC/INDENT|
+-----+ +-----+ +-----93+
```

PS 620144501  
1 November 1985

103

```
+-----+
|PSSTRC/COBSUB|
+-----+
|
+-----+
|
|
|
+---+ +---+ +---+
|BLEN| |FPRINTF| |PSSTRC/INDENT|
+---+ +---+ +---+93+
```

PS 620144501  
1 November 1985

104

```
      +-----+  
      |SELWS|  
      +-----+  
      |  
+-----+-----+-----+-----+-----+-----+  
| | | | | |  
+---+---+ +---+---+ +---+---+ +---+---+ +---+---+ +---+---+  
|MAKPS| |NULBLK| |STRCPY| |DASH| |INDENT| |(CONT)|  
+---112+ +---76+ +---+---+ +---92+ +---75+ +---113+
```



PS 620144501  
1 November 1985

105

```
      +-----+  
      | INSW |  
      +-----+  
      |  
+-----+-----+-----+-----+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
| NULBLK | | STRCPY | | DASH  | | INDENT | | FPRINTF | | (CONT) |  
+-----76+ +-----+ +---92+ +-----75+ +-----+ +---114+
```

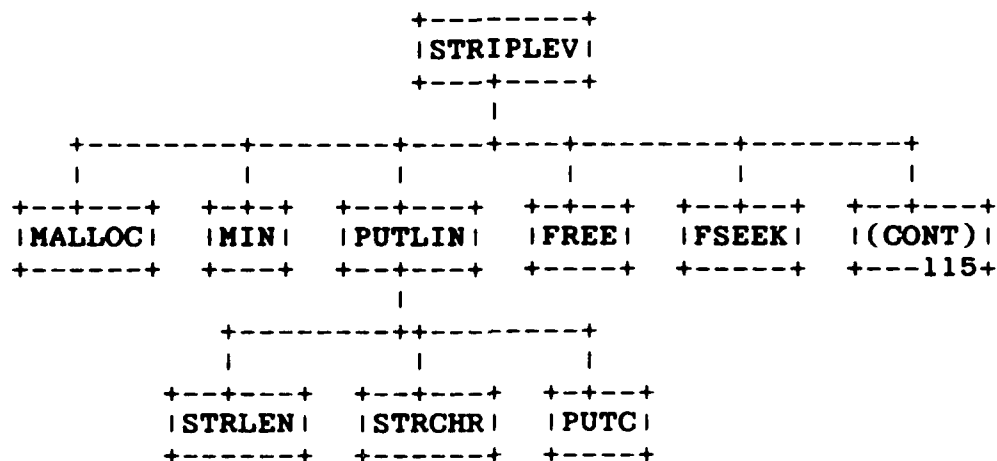
PS 620144501  
1 November 1985

106

```

      +---+
      |FD|
      +-+
      |
+-----+
|         |         |
+---+---+ +---+---+ +---+---+
|SELLEN| |FPRINTF| |INDENT|
+---+---+ +---+---+ +---+---+
|         |         |
|         |         |
+---+---+
|BLEN|
+---+

```



PS 620144501  
1 November 1985

108

```
      +-----+
      |DRAWLEV|
      +-----+
      |
+-----+-----+-----+-----+-----+
|         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|MALLOC| |FSEEK| |GETC| |MEMCPY| |FGETS| |(CONT)|
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
                                         +---116+
```

PS 620144501  
1 November 1985

109

```
      +-----+
      |DOINDEX|
      +-----+
      |
+-----+-----+-----+-----+-----+
|      |      |      |      |      |      |
+---+ +---+ +---+ +---+ +---+ +---+
|SORT| |MALLOC| |STRCMP| |PUTC| |FREE| |(CONT)|
+--117+ +-----+ +-----+ +-----+ +-----+ +---118+
```

PS 620144501  
1 November 1985

110

```

      +-----+
      | PRNTREE |
      +-----+
        |
+-----+-----+-----+-----+
|         |         |         |
+-----+ +-----+ +-----+ +-----+
| (CONT) | | FPUTS | | SPRINTF | | STRLEN |
+-----+ +-----+ +-----+ +-----+
| -95    | |       | |       | |       |
+-----+ +-----+ +-----+ +-----+

```

PS 620144501  
1 November 1985

111

+-----+  
| YYLEX |  
+-----+  
|

+-----+ 					
+-----+   (CONT)	+-----+   UNGETC	+-----+   WARNING	+-----+   STRCMP	+-----+   CSTASH	+-----+   (CONT)
+-----98+	+-----+	+-----15+	+-----+	+-----83+	+-----119+

PS 620144501  
1 November 1985

112

```
      +-----+
      |MAKPS|
      +---+---+
          |
    +-----+-----+
    |           |           |
+---+---+---+ +---+---+---+
|PSSTRC/CSUB| |PSSTRC/COBSUB|
+-----102+ +-----103+
```



PS 620144501  
1 November 1985

113

```
+-----+
|SELWS|
+-----+
|
+-----+-----+-----+-----+-----+
|      |      |      |      |      |      |
+-----+-----+-----+-----+-----+
|(CONT)| |FPRINTF| |MAKWHE$| |SELWS| |MAKES| |(CONT)|
+---104+ +-----+ +-----+ +---104+ +---120+ +---121+
|
+-----+-----+-----+-----+
|      |      |      |      |
+-----+-----+-----+-----+
|INDENT| |FPRINTF| |MAKWHE$/CWHES| |MAKWHE$/COBWHE$|
+---75+ +-----+ +-----+ +-----122+
```

PS 620144501  
1 November 1985

114

```
      +-----+  
      |INSWS|  
      +---+---+  
      |  
      +-----+ +-----+ +-----+  
      |         |         |         |  
      +---+---+ +---+---+ +---+---+  
      |(CONT)| |MAKES| |SAVEES|  
      +---105+ +---120+ +---126+
```

PS 620144501  
1 November 1985

115

```

+-----+
|STRIPLEV|
+-----+
|
+-----+
|         |         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | |GETC| |MEMCPY| |FGETS| |STRLEN| |MEMSET|
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| 107    | |         | |         | |         | |         | |         |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+

```

PS 620144501  
1 November 1985

116

```
      +-----+  
      |DRAWLEV|  
      +-----+  
      |  
+-----+  
|         |         |         |         |         |  
+---+---+ +---+---+ +---+---+ +---+---+ +---+---+ +---+---+  
|(CONT)| |STRLEN| |PUTLIN| |FREE| |MEMSET| |(CONT)|  
+---108+ +-----+ +---107+ +---+ +-----+ +---123+
```

PS 620144501  
1 November 1985

117

```
      +---+
      | SORT |
      +---+
      |
+-----+-----+-----+-----+
|         |         |         |         |
+---+---+ +---+---+ +---+---+ +---+---+
| MALLOC | | STRCPY | | STRUPC | | STRCMP |
+---+---+ +---+---+ +---+---+ +---+---+
```

PS 620144501  
1 November 1985

118

```

+-----+
|DOINDEX|
+-----+
|
+-----+
|          |          |          |          |          |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|(CONT)| |FPUTS| |MEMSET| |STRLEN| |MEMCPY| |(CONT)|
+---109+ +-----+ +-----+ +-----+ +-----+ +---124+
```

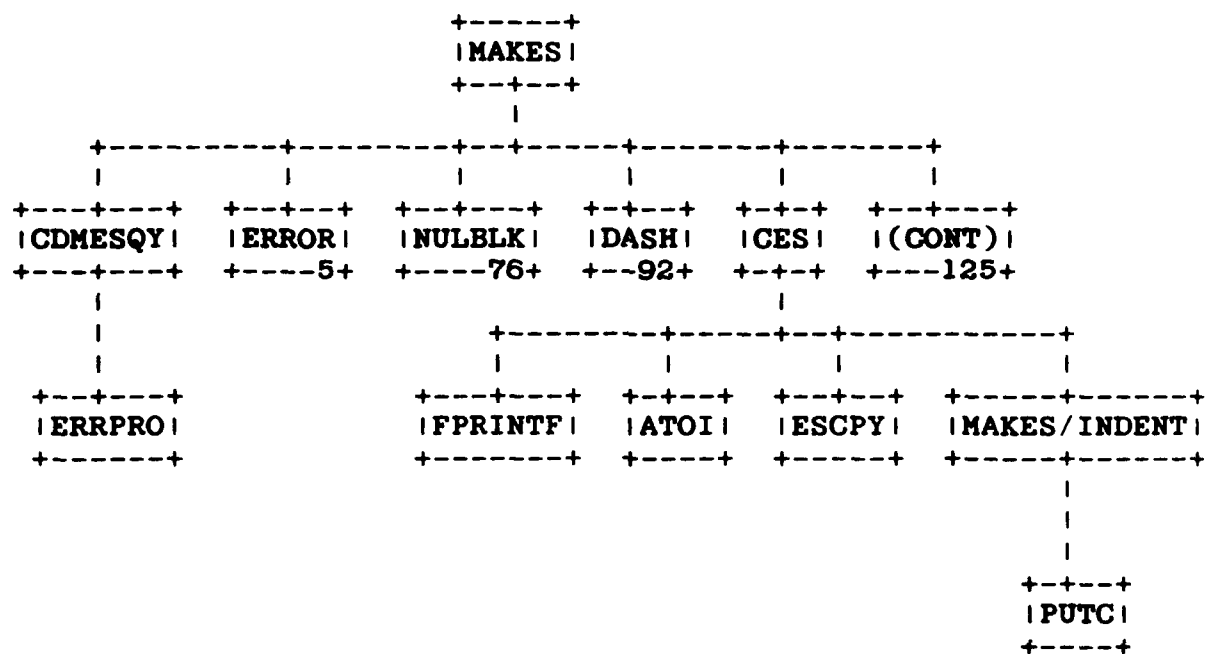
PS 620144501  
1 November 1985

119

```

+-----+
| YYLEX |
+-----+
|
+-----+-----+-----+-----+-----+
| | | | | |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | | ATOF | | ISALPHA | | TOUPPER | | ATOI | | ISSPACE |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| -111 | | | | | |

```





PS 620144501  
1 November 1985

121

```

+-----+
|SELWS|
+-----+
|
+-----+-----+-----+-----+
|
+-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | |GETCOL| |GETTBL| |STRCMP| |SAVEES|
+-----+ +-----+ +-----+ +-----+ +-----+
| 113 | | 92 | | 88 | | 126 |

```

PS 620144501  
1 November 1985

122

```

+-----+
|MAKWHES/COBWHE|
+-----+
|
+-----+-----+-----+-----+
|
|
+-----+-----+-----+-----+
|MAKWHES/NUMPIC| |FPRINTF| |INDENT| |DASH| |(CONT)|
+-----+-----+-----+-----+
|
|
+-----+
|FPRINTF|
+-----+

```

PS 620144501  
1 November 1985

123

```
      +-----+
      |DRAWLEV|
      +-----+
        |
    +-----+-----+
    |         |         |
+---+---+ +---+---+ +---+---+
| (CONT) | | SPRINTF | | GETTOP |
+---116+ +-----+ +-----+
```

PS 620144501  
1 November 1985

124

```
      +-----+
      |DOINDEX|
      +-----+
        |
    +-----+
    |         |
    |         |         |
+---+---+ +---+---+ +---+---+
| (CONT) | | SPRINTF | | GETTOP |
+---118+ +---+---+ +---+---+
```

PS 620144501  
1 November 1985

125

```

+-----+
| MAKES |
+-----+
|
+-----+-----+-----+-----+-----+
| | | | | |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| (CONT) | | COBES | | CCONV | | COBCONV | | STRCPY | | (CONT) |
+-----120+ +-----128+ +-----+ +-----129+ +-----+ +-----130+
|
+-----+-----+-----+-----+
| | | | |
+-----+ +-----+ +-----+ +-----+ +-----+
| ATOI | | ESCPY | | STRNCMP | | FPRINTF | | MAKES/INDENT |
+-----+ +-----+ +-----+ +-----+ +-----120+

```

PS 620144501  
1 November 1985

126

```
      +-----+
      |SAVEES|
      +-----+
      |
+-----+-----+-----+-----+
|         |         |         |         |
+-----+ +-----+ +-----+ +-----+ +-----+
|NULBLK| |STRNCMP| |STRLEN| |ESCPY| |ATOI|
+-----+ +-----+ +-----+ +-----+ +-----+
|-----76+|         |         |         |         |
```

PS 620144501  
1 November 1985

127

```
+-----+
|MAKWHES/COBWHES|
+-----+
|
+-----+
|           |           |
+---+---+ +---+---+ +---+---+
| (CONT) | |GETTBL| |GETCOL|
+---122+ +---88+ +---92+
```

PS 620144501  
1 November 1985

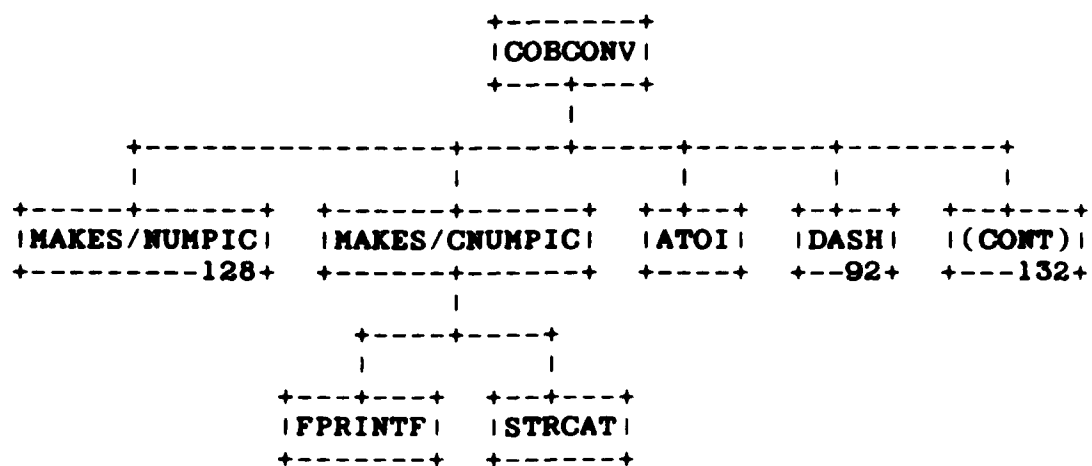
128

```
+-----+
| COBES |
+-----+
|
+-----+-----+-----+-----+
| | | | |
+-----+-----+-----+-----+
| MAKES/NUMPIC | FPRINTF | MAKES/INDENT | ATOI | (CONT) |
+-----+-----+-----120+-----+-----131+
|
|
+-----+
| FPRINTF |
+-----+
```



PS 620144501  
1 November 1985

129



PS 620144501  
1 November 1985

130

```
      +-----+
      | MAKES |
      +-----+
        |
    +-----+
    |         |
    |         |
+---+---+---+ +---+---+---+ +---+---+---+
| (CONT) | | STRNCPY | | STRLEN |
+---125+ +---+---+---+ +---+---+---+
```

PS 620144501  
1 November 1985

131

```
      +-----+  
      |COBES|  
      +---+---+  
      |  
+-----+-----+  
|         |         |  
+---+---+ +---+---+ +---+---+  
| (CONT) | |DASH| |ESCPY|  
+---128+ +---92+ +-----+
```

PS 620144501  
1 November 1985

132

```
      +-----+  
      |COBCONV|  
      +-----+  
      |  
+-----+-----+-----+-----+  
|         |         |         |         |  
+---+---+ +---+---+ +---+---+ +---+---+  
| (CONT) | |ESCPY| |FPRINTF| |MAKES/INDENT|  
+---129+ +---+---+ +---+---+ +---+---120+
```

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ABS		ESCPY	
ACTRSV.....	21	ESPSMAP.....	91
ADDCHK.....	43	ESPSMAP/INDENT...	100
ADDFRM		FATAL.....	42
ARRANGE.....	41	FCLOSE	
ASSIGN.....	94	FD.....	106
ATOF		FGETS	
ATOI		FILELNK.....	78
BLDMOD.....	79	FLANCI.....	6
BLDNODE.....	39	FLDRSV.....	20
BLDSUB.....	23	FLDTYP	
BLN		FNDATT.....	84
BSCODE.....	35	FNDFRM.....	18
CALCSTAT.....	69	FOPEN	
CALLOC		FPRINTF	
CCONV.....	125	FPUTS	
CDMESQY.....	120	FREE	
CES.....	120	FRMPDAT.....	54
CESPS		FRNTND.....	4
CHKARY.....	65	FSEEK	
CHKFLD.....	63	FTELL	
CHKFRM.....	43	FWRITE	
CHKGRP.....	86	GDATA	
CHKSIZE.....	76	GEN.....	22
CLOSEGAP.....	14	GENAA.....	24
CLRNDP.....	86	GENAAL.....	24
CLSFIL.....	90	GENACT.....	24
COBCONV.....	129	GENAE.....	57
COBES.....	128	GENAH.....	57
COBESPS.....	91	GENAI.....	74
COBPE.....	76	GENAL.....	36
COPFLD		GENAP.....	54
COPYNODE.....	80	GENAQ.....	56
CPE		GENAR.....	55
CSTASH.....	83	GENAS.....	72
CTLRSV.....	20	GENAT.....	73
DASH.....	92	GENBEG.....	22
DATAGEN.....	78	GENCHG.....	34
DBFREAD.....	35	GENDB.....	49
DCLINDX.....	53	GENDOA.....	36
DELFLD		GENDS.....	49
DELNODE.....	14	GENFP.....	47
DOINDEX.....	109	GENFS.....	46
DRAWLEV.....	108	GENFSD.....	33
ENDGEN.....	75	GENINS.....	49
ERROR.....	5	GENMAIN.....	22
ERRPRO		GENNDP.....	48

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GENPAG.....	13	MAKWHEs/NUMPIC....	122
GETC		MALLOC	
GETCOL.....	92	MAP	
GETFILE.....	5	MAPDB.....	51
GETFIT.....	61	MAX	
GETLOWLEF		MEMCMP	
GETLOWRIT		MEMCPY	
GETPAR.....	59	MEMSET	
GETPTH.....	19	MIN	
GETSIZE.....	61	MKINC.....	32
GETTBL.....	88	MKPOS.....	27
GETTOP		MLPFRM.....	18
GETUPLFT		MODPAGE.....	41
GFLDPT.....	64	MOVCLD.....	60
GRP/MAIN.....	2	MOVECLD.....	61
HASDATA.....	23	MYALLOC.....	10
HASITEM.....	32	NDMLGEN.....	37
HASLOWER		NDMLLAB.....	77
HBALANC.....	62	NDMLLNK.....	93
HRW/MAIN.....	3	NEXTLEV	
INDENT.....	75	NULBLK.....	76
INITAL		OISCR	
INITFP		OPNFIL.....	89
INSERT.....	92	OUTSCR	
INSMAP		PAGNODE.....	80
INRSRV.....	21	PAGTREE.....	61
INSWS.....	105	PEMAP.....	76
ISALNUM		PMSGLC	
ISALPHA		PMSGLS	
ISDIGIT		PRINTF	
ISOPNE		PRNT.....	1
ISSPACE		PRNTREE.....	81
MAKACT.....	10	PROCGEN.....	77
MAKES.....	120	PSESMAP	
MAKES/CNUMPIC....	129	PSSTRC/COBSUB....	103
MAKES/INDENT....	120	PSSTRC/CSUB.....	102
MAKES/NUMPIC....	128	PSSTRC/INDENT....	93
MAKFLD		PTHPTR	
MAKINS.....	101	PUTATT	
MAKINT.....	10	PUTC	
MAKPS.....	112	PUTCUR	
MAKQR.....	45	PUTLIN.....	107
MAKSTR.....	64	READDB.....	35
MAKWH.....	93	READTREE.....	39
MAKWHEs.....	113	REPOS.....	40
MAKWHEs/COBWHEs..	122	RSETNDP.....	50
MAKWHEs/CWHEs		RSETSTAT.....	54

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RWEXPD.....	17	WRTFRM/TBFCLOS....	29
RWOPN.....	12	WRTFRM/WRTDBF....	44
RWSP/FIXFRM.....	17	WRTFRM/WRTFLD....	28
SAVEES.....	126	WRTFRM/WRTTBF....	29
SELECT.....	76	WRTFRM/WRTTXT....	16
SELGEN.....	76	YYERROR	
SELLEN.....	106	YYLEX.....	98
SELMAP.....	91	YYPARSE.....	6
SELOPN.....	71		
SELRSV.....	31		
SELWHR.....	56		
SELWS.....	104		
SETNDP.....	52		
SORT.....	117		
SPLICE.....	40		
SPLITNODE.....	41		
SPRINTF			
STATRSV.....	20		
STDCODE.....	58		
STRASN			
STRCAT			
STRCHR			
STRCMP			
STRCPY			
STRIPLEV.....	107		
STRLEN			
STRNCMP			
STRNCPY			
STRSPN			
STRUPC			
SYSMSG			
TERMFP			
TOUPPER			
TRGRSV.....	21		
TRMNAT			
TRMNDML			
UNGETC			
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### 3.11 Program Listings Comments

This information is contained in the Module Descriptions in section 3.10.



## SECTION 4

### QUALITY ASSURANCE PROVISIONS

#### 4.1 Introduction and Definitions

"Testing" is a systematic process that may be preplanned and explicitly stated. Test techniques and procedures may be defined in advance, and a sequence of test steps may be specified. "Debugging" is the process of isolation and correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing programs in such a way as to make bugs less likely to occur and when they do occur, to make them more noticeable to the programmer and the user. In other words, as much error checking as is practical and possible in each routine should be performed.

#### 4.2 Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the normal testing techniques that are accomplished during the construction process. They consist of design and code walk-throughs, unit testing, and integration testing. These tests are performed by the design team. Structured design, design walk-through and the incorporation of "antibugging" facilitate this testing by exposing and addressing problem areas before they become coded "bugs."

END

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